

## Navy Awards Pomona Funds For Sparrow 7M

Pomona has received a \$108 million contract to begin production of 1,344 Sparrow AIM/RIM 7M radar-guided air-to-air missiles for the U.S. Navy and Air Force. Total value of the contract when definitized will be approximately \$215 million. The work will be performed at the division's facilities in Camden, Ark.

Sparrow AIM/RIM 7M is an advanced version of the missile featuring mono-pulse guidance and digital signal processing.

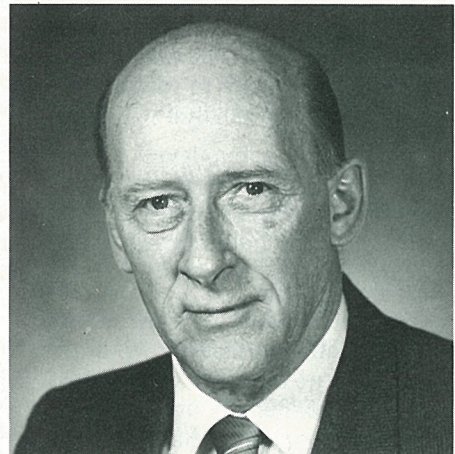
This new contract, the third Sparrow AIM/RIM 7 M contract awarded to the division by the Naval Air Systems Command, brings the total of missiles under contract to more than 2,000.

Production of the 1,344 missiles and spare parts under the new contract will begin immediately, with first deliveries scheduled to be made in 1984 and continuing through January 1985. Production rates will be approximately 100 per month.

The first Sparrow AIM/RIM 7M contract, awarded to the division in mid-1981, was for 20 qualification missiles plus tooling and test equipment. Successful completion of production and testing resulted in the division becoming a qualified Sparrow AIM/RIM 7M producer.

The second contract was awarded in February 1982 and was for an additional 690 missiles plus tooling and test equipment.

## Tovar Elected GD Corporate Vice President



Fritz G. Tovar

Fritz G. Tovar has been elected a Corporate Vice President of General Dynamics Corporation and named Vice President-General Manager, Electric Boat Division.

Tovar, who has been General Manager of Electric Boat since November 1981, joined the company in 1975 as General Manager of the Quincy Shipbuilding Division's Charleston (S.C.) Facility. In 1977, he joined Electric Boat's Quonset Point (R.I.) Facility as General Manager.

"Fritz Tovar has done an excellent job as General Manager of Electric Boat for the past 14 months," said David S. Lewis, Chairman and Chief Executive Officer of General Dynamics. "We are confident that he will be an outstanding leader for the division in their busy years ahead."

Tovar's extensive shipbuilding and management experience includes positions of increasing responsibility with Davie Shipbuilding Ltd. in Canada, American Transport Corporation in Sharon, Penn., and Marine Transport Lines, Inc., a New York City-based subsidiary of GATX.

Tovar, 59, is a native of West Germany where he received degrees in business administration and mechanical engineering.



**Goes on Duty.** The USS City of Corpus Christi was placed into service at the Navy Submarine Base at Groton, Conn., January 8th.

## Sen. Tower Speaks at Ceremony For USS City of Corpus Christi

Another Electric Boat-built 688-class fast-attack submarine joined the U.S. Navy fleet on January 8th.

The USS *City of Corpus Christi*, SSN 705, the division's 13th submarine of the 688 class, was commissioned during ceremonies at the U.S. Navy Submarine Base in Groton.

Senator John Tower, Republican of Texas and Chairman of the Senate Armed Services Committee, was the principal speaker. He told guests on hand for the event the United States "cannot outbuild or outspend the Soviets if they maintain their current shipbuilding rates. But we can ensure that we do build as much as we can afford."

Sen. Tower said he fully backs the Navy's plan for a 600-ship fleet by the 1990s. He said this requires a construction rate of at least 25 vessels a year. "It is obvious to me," Tower continued, "that we must also maintain a submarine building rate of three to four boats per year."

The Senator went on to say that "we don't need to beat the Soviets in numbers, but we must be qualitatively superior."

Accompanying Tower was his wife, Lilla, who had christened the 360-foot, 6,900-ton submarine at its launching on April 25, 1981.

David S. Lewis, Chairman of the Board of General Dynamics, said it was a great honor to "have this opportunity to represent the 25,000 men and women of Electric Boat. USS *City of Corpus Christi* is ready in every respect to carry out her mission. We salute the officers and crew and wish USS *City of Corpus Christi* Godspeed in the service of the Navy and our country."

EB delivered the *City of Corpus Christi* on November 24, 1982 — a month early. She was the second boat of her class to be delivered by EB during the year. *Baltimore*, SSN 704, was turned over to the Navy earlier in the year.

## AFTI/F-16 Used for First Voice Command Test

An AFTI/F-16 test pilot, U.S. Air Force Lt. Col. Harry Heimple, conducted the first engineering check-out of the aircraft's voice command electronics during a flight at Edwards AFB, Calif., on December 22nd.

Col. Heimple spoke the words "strafe" and "air-to-surface" to activate the voice control system aboard the General Dynamics AFTI/F-16.

The voice tests will increase in complexity as words are spoken in flight during ever-increasing noise, vibration and G levels. They'll culminate next summer when an AFTI/F-16 pilot is allowed to control switch selection, display formats and master modes by using the full voice vocabulary of 36 words in the voice command system.

A one-of-a-kind testbed aircraft, the Advanced Fighter Technology Integration F-16 is jointly sponsored by the Air Force, NASA and the Navy. Program management is the responsibility of the Flight Dynamics Laboratory at Wright-Patterson AFB, Ohio.

Voice is being explored for its potential use in future aircraft, especially ones designed for low-altitude, high-speed flight.

Ideally, a fighter pilot prefers to keep his eyes directed outside the cockpit, looking for enemy targets and to maintain hands-on control of the aircraft.

In the future, however, voice command may allow the pilot to operate the aircraft avionics and flight control modes without taking his hands off crucial flight controls and without focusing his attention inside the cockpit.

The AFTI/F-16 pilot uses the voice command system merely by speaking into his oxygen mask microphone and observes the appropriate response on TV-type displays in the cockpit, giving him immediate information on the status of his aircraft.

Each AFTI/F-16 test pilot will have a personalized voice cassette of how he pronounces the 36 command words now in the voice system vocabulary. Once in the cockpit, the pilot loads his cassette of voice patterns into a "data transfer module" — an electronic box resembling a tape recorder. From the module, the voice patterns are sent to the voice command computer which stores individual word

## Quincy Receives Option for Three Logistics Ships

The U.S. Navy exercised a \$348.9 million option for three additional maritime prepositioning (TAKX) ships to be built at Quincy Shipbuilding Division and chartered to the Navy under long-term charter and hire contracts.

This brings to five the number of TAKX ships to be built at Quincy and increases the shipyard's backlog by \$770 million. Employment is expected to grow from the present level of approximately 2,100 to a peak of about 5,000 in the course of this program.

Division management said every effort is being made to accelerate construction to minimize the current decline of Quincy's work force, speed the recall of laid-off workers and make it possible to begin the longer term manpower buildup needed to support the program.

The mission of TAKX ships is to support the nation's Rapid Deployment Force. Each of the 671-foot-long, 22,700-ton ships has the capacity to transport and store the vehicles, ammunition, rations, fuel and other material required by a force of 3,000 Marines. The ships will be stationed, fully loaded, at forward bases near areas of potential conflict.

## Contract Awarded To DatagraphiX

DatagraphiX has received a \$3.7 million follow-on contract from the Naval Air Systems Command for production of antisubmarine warfare tactical display systems.

The AN/ASA-70 tactical displays are components of the A-NEW antisubmarine warfare system installed in U.S. Navy P-3C aircraft. A-NEW elements are used for presentation of stored data and tactical situation information for antisubmarine aircraft crews.



The Advanced Fighter Technology Integration F-16



# Convair to Develop Centaur "G" For Air Force Space Missions

Convair's Centaur upper stage, already selected for two NASA planetary missions from the Space Shuttle in 1986, will also be used by the U.S. Air Force to launch two payloads from the Shuttle Orbiter's cargo bay in 1987.

According to C. E. Wilson, Shuttle/Centaur Program Director, NASA and the Air Force have agreed to share the development costs for a short wide-body stage designated Centaur G.

"This decision firmly establishes Centaur as the high-energy upper stage for the Space Transportation System. It offers an enormous opportunity for us to extend our launch vehicle business well into the next decade as Shuttle/Centaur applications develop," he said.

Earlier this year, Convair received the go-ahead to begin development of NASA's Centaur G-Prime. The company is working under a NASA letter contract of about \$200 million for two G-Prime stages. The Centaur G-Prime stage is approximately 29 feet long, and about 14 feet in diameter. NASA has scheduled its two planetary

missions for May 1986. The first Centaur launch from the Shuttle will send the Galileo spacecraft to explore Jupiter. NASA's other Centaur stage will launch the International Solar Polar Mission on a scientific journey to the Sun.

The Centaur G stage for the Air Force missions is a shorter version of the G-Prime — a little more than 19 feet long. It will be able to accommodate a 40-foot long payload and have the capability to place a 10,000-pound payload into geosynchronous orbit.

Two Shuttle Orbiters are to be modified for the Centaur missions. They are the Challenger (OV-099) and the Atlantis (OV-104). Modifications include adding ports on both sides of the cargo bay for fueling and fuel dump of the Centaur's liquid oxygen and liquid hydrogen as well as vents for boil-off of the gases.

The joint NASA/Air Force program will be managed by NASA's Lewis Research Center, which has been responsible for development of Centaur since the beginning of the program in the early 1960s.

# Convair, DSD Develop Missile Launch Procedures Trainer

When the U.S. Air Force deploys Tomahawk Ground-Launched Cruise Missile units to Europe later this year, their crews will be thoroughly trained experts who have already "launched" a number of missiles.

However, these practice "launches" will have been made using a Missile Procedures Trainer developed through the combined efforts of Convair, Data Systems Division's Western Center and a subcontractor, System Development Corporation.

Over the course of the 14-month program, more than 100 engineers and technicians were involved in the conception, design, development and fabrication of the MPT system. More than 60 software designers, engineers and development experts modified operational GLCM software and integrated it with instructor control software. The completed MPT was delivered last month ahead of schedule to Davis-Monthan AFB, Ariz., the training site for GLCM crews.

The MPT consists of an Instructor Control Unit shelter, a Launch Control Center and associated software. The Instructor Control Unit simulates the external communications, the missiles and launchers of a GLCM flight for the student Launch Control Officers. Provisions are made for the instructor to insert faults, cause alarms and monitor student actions. Means are also provided for instructors to generate lesson plans and training scenarios for progressive exposure of students to real world launch problems.

During a typical training scenario, the instructor establishes a lesson plan with the target data, mission data and launch sequence. The plan is contained in the Instructor Control Unit and communicated through a fiber optics link to the Launch Control Center where monitors display the necessary information to initiate the launch sequence. The students load mission data and target information, calibrate the Tomahawk and "launch" the missile on a simulated mission.

Citing the MPT as "an item of absolutely critical importance" to the GLCM program, USAF Lt. Col. Frank H. Tubbesing, Jr., Deputy Program Manager for

GLCM Systems, said, "Convair management recognized the essential nature of the program and assigned a top notch team to tackle the development."

The MPT software was designed, tested and implemented using DSD's Software Engineering System which was used to great advantage to efficiently develop and test the software in real time. The software was delivered fully documented against Military Standards requirements — 29 documents comprising 5,000 pages of text and 20,000 pages of computer listings.

"The success of this project can be, in a large part, attributed to the individuals assigned this task," said Terry Straeter, Director of DSD's Western Center. "Their dedication and team effort were essential in meeting the company's commitment. The Test and Validation Group from DSD's Software Quality Department met the government challenge of independently validating the software while working in close coordination with the developers, customer and project management."

Key people involved in the program were: Orison Wade, Convair MPT Program Manager; William Löwe, Convair MPT Chief Engineer; William Murray, DSD Western Center MPT Software Manager; Jerry Owen, Convair MPT Design and Fabrication Manager, and Bill Maddox, DSD Lead MPT Software Engineer.

# FB-111s Capture Air Force Bombing Competition Award

U.S. Air Force crews flying Fort Worth-built FB-111s beat out other bombers to win a major award in the recent 1982 Strategic Air Command annual bombing and navigation competition.

The 509th Bomb Wing from Pease AFB, N.H., earned the prestigious Fairchild Trophy, which is presented to the SAC wing with the highest combined bomber and tanker scores. FB-111s have won this award in seven of the last eight years.

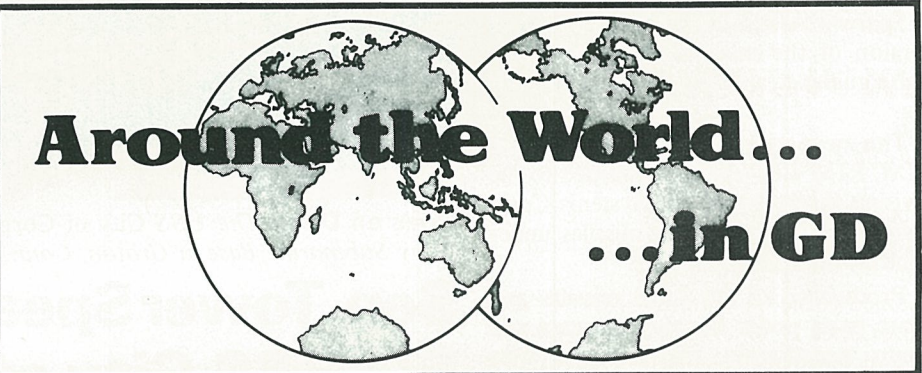
# To All Employees

Equal Employment Opportunity continues to be an important and integral part of our management philosophy at General Dynamics. We recruit, hire, train and promote persons in all job classifications without regard to race, color, religion, sex, age or national origin and base decisions on employment so as to further the principle of equal employment opportunity. We will fulfill, as well, our obligations with respect to the handicapped and veterans. It is our job to insure that all of our personnel actions are executed and administered on this sound basis.

As a result of our policy and practice of according Equal Employment Opportunities to all, we have made significant progress in increasing the representation of minority groups and women at all levels throughout the company. We must continue our commitments to Affirmative Action at every General Dynamics operation and facility and see to it that equal opportunity exists in fact as well as in policy. I am committed to this. I expect all members of our management team to have the same commitment.

*D.S. Lewis*

David S. Lewis  
Chairman



**CHQ:** Michael C. Rardin joined as Planning/Control Specialist . . . Edward Brunt-rager was promoted to Corporate Director, International Personnel . . . Roylene M. McNeal joined as Subcontract Auditor . . . Edward M. Greer transferred from Fort Worth and was promoted to Corporate Representative, Fort Walton Beach . . . Robert E. Johnson joined as Corporate Manager, Financial Planning . . . Theodore McFarland was promoted to Corporate Manager, International Programs.

**Fort Worth:** C. L. Battle, A. J. Hill and G. D. Read were promoted to Assistant Project Engineer . . . W. D. Huckaby, O. W. McGregor Jr. and P. D. Savage to Project Engineer . . . B. E. Kenny and J. M. Muinos to Field Service Engineer . . . C. C. Leaghty, II to Senior Field Service Engineer . . . R. W. Manney to Engineering Chief . . . J. G. Moore to Engineering Administrative Supervisor . . . P. T. Ongena to Senior Material Project Administrator . . . C. R. Perry to Field Operations Supervisor . . . G. P. Rambo Jr. to Chief of Logistics Support Administration . . . R. L. Sharp to Manufacturing Control Supervisor . . . B. G. Stevens to Senior Field Supply Analyst . . . D. A. Varuska to Material Planning Supervisor.

**GD Services:** J. H. Smith was promoted to Assistant Workshop Group Leader.

**Pomona:** Clarence J. Dreany, Carl B. Smith and Larry J. Poullard were promoted to Superintendent . . . Alan G. Fabos, William J. Carter, Robert P. Florkowski and Kelman M. Miller to Group Engineer . . . Irma R. McPartland to Material Liaison Representative . . . Lawrence E. McRay to Technical Procurement Administrator . . . Jack L. Morgan to Senior Project Engineer . . . Patricia A. Whitney to Master Scheduling Analyst . . . Ronnie D. Abbott to Section Head . . . Eric R. Baker to Purchasing Agent . . . Frank J. Cuccio to Publications Technical Specialist . . . J. R. Doherty and Kenneth P. Potokar to Chief, Cost Control . . . James Salata to Chief, Plant Engineering . . . Chris J. Coffield and Avelino R. Sanchez to Manufacturing Supervisor . . . At Camden, William C. Doyle to Senior Cost Analyst . . . Marjorie S. Royle to Logistics Representative.

**Convair:** William Amavisca Jr., Benjamin J. Sanchez and Bert T. Johnson Jr. were promoted to Operations Supervisor - Manufacturing Control . . . Ralph A. Lucas to Operations Supervisor - Transportation . . . Millard K. Winslow to Logistics Supervisor . . . Wendy E. York to Publications Production Supervisor . . . John R. Cash, Joseph L. Hoover and James M. Parrotte to Chief, Publications . . . Marilyn R. Dehner to Operations Supervisor - Plant Services . . . Elizabeth R. Ford to Group Supervisor . . . Edward J. Hujsak to Engineering Staff Specialist . . . Daniel W. Newby, Cecil R. Powell and Brian S. Ruark to Quality Assurance Supervisor . . . Ronald D. Thomas to Operations General Supervisor - Manufacturing.

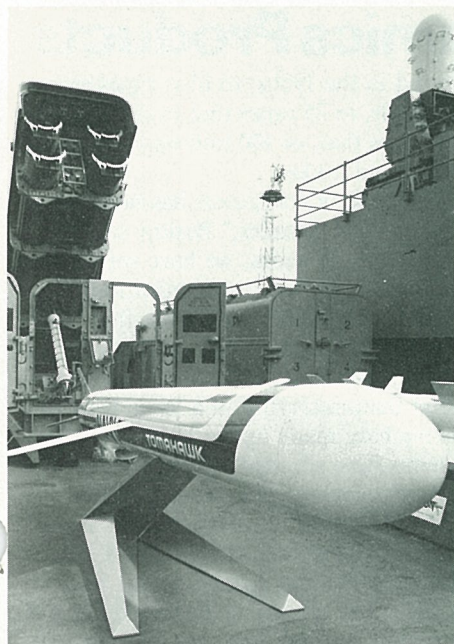
**Land Systems:** Allie Holtzapple was promoted to Maintenance Superintendent - Cross Services . . . Mark Torbert to Program Planning & Scheduling Supervisor . . . Kurt Lammers to Product Engineering Supervisor . . . Paul Zaborowicz to Test Track Paint & Shipping General Foreman . . . Ronald Meadows to Tool Crib Foreman . . . Jack Kennedy to Follow-up & Production Control Liaison Supervisor . . . John Szuch to Scheduling Supervisor . . . Roy George and Nathaniel Cunningham to Quality Assurance Engineer . . . Marilyn Reisman to Planning Department Supervisor . . . Roger Johns to Gage Engineering Supervisor . . . Randall Smith and Clyde Partin to Sergeant, Plant Protection . . . Chestel Powers to Captain, Plant Protection . . . Fred Scotti to Industrial Security Captain . . . Bonnie Parks to Programs Control Analyst B . . . Robert Melling Jr. to Quality Engineering Supervisor . . . Theodore Sandberg to Advanced Development Engineer B . . . Philip Shibley to Product Drafting Supervisor . . . Patrick Sullivan to Manager, Engineering Personnel Services . . . Harold Nolan to Technical Training Supervisor . . . Daniel Monaghan to Product Design & Development Supervisor . . . John Morgan to Product Drafting & Records Supervisor . . . Theodore Janish to Electro-Mechanical Instrumentation Analyst A . . . Gerald Strehl to Product Design & Development General Supervisor . . . James Thomas to Engineering Manager - Defense Engineering . . . Thomas Offer to Drafting Configuration Management & Control Manager . . . George O'Brian to Resident Field Engineering Representative . . . Jean Pfister to Project Engineer A . . . William Rihm to Systems Planner . . . Eugene King and Norman Andrews to Supplier Liaison Representative . . . Joseph Agler to Clean Team Supervisor . . . Thomas Bartkowicz to Purchasing Technical Analyst . . . John White to Material Master Planner . . . James Kustowski to Material Supervisor . . . Raymond Lafferty to Material Management Supervisor . . . Walter Rhodes to Chief, Procurement . . . Melvin Ryan to Manager, Production Procurement . . . Claude Sellers to Vehicle Repair Foreman . . . Thomas Youngpeter to Skilled Maintenance Foreman.

**Electric Boat:** Ronald Peterson and Roger LaCourse to Superintendent . . . Stuart Brown to Project Engineering Assistant . . . Michael Donch to Chief of Design . . . James Neidhardt to Test Operations Engineer . . . At Quonset Point, Dana Jacques to Group Trade Planner . . . Douglas Mosher to Chief of Nuclear Quality Control . . . Russell Christy to Supervisor, Production Methods Engineering.

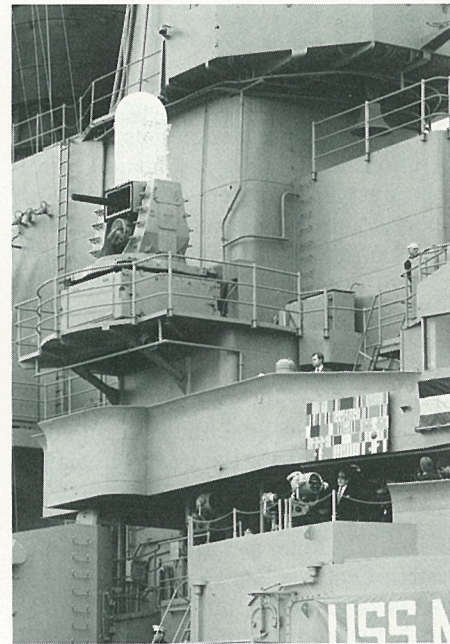
# Savings and Stock Investment Values

Salaried	Nov. 1980	Nov. 1981	Nov. 1982
Government Bonds	\$ 2.4446	\$ 2.8071	\$ 3.3096
Diversified Portfolio	2.2079	2.1371	2.5804
Fixed Income	1.1448	1.2718	1.4172
Hourly			
Government Bonds	2.4424	2.8045	3.3076
Diversified Portfolio	2.2528	2.1824	2.6352
GD Stock	\$40.3750	\$23.2500	\$31.1300





**Battleship Back in Service.** The USS New Jersey was recommissioned by President Reagan at the Long Beach Naval Shipyard on December 28th. The ship is equipped with four Pomona-built Phalanx systems for close-in defense (right) and will be deployed with 32 Convair-built Tomahawk cruise missiles and their armored box launchers (left) for antiship and land-attack missions. The refurbished World War II-era battleship was described by the President as the "most modern warship on the high seas."



## Six Appointed to Key Operations Management Positions at Convair

Six executive appointments have been made in the Convair Operations Department.

Named to new positions were: Ed M. Squires, Jack D. Coffman, Jim W. Annis, Dave W. Cormany, Dan R. Agee and D. George Williams. All report to Kenneth S. Lake, Vice President-Operations.

Squires was appointed Vice President-Cruise Missiles Product Line. He joined the company in 1970, and was previously Vice President-Production at Convair. A native of Kentucky, Squires received his Bachelor of Science in Industrial Engineering and Management from the University of Kentucky, Lexington,

and a Master of Business Administration degree in Finance from Creighton University, Omaha, Neb.

Coffman joined Convair from Fort Worth and was named Director of Fabrication and Tooling. He began his General Dynamics career at Fort Worth in 1966 and has held a series of positions there in areas of manufacturing and quality assurance, most recently Director of Product Planning and Control. He studied industrial management at Texas Wesleyan College, Fort Worth, and Abilene Christian College.

Annis was appointed Director of Manufacturing Engineering. He previously was Manager of Production Support for the Phalanx program at Pomona. He has been with the company since 1958. Annis received his Bachelor of Science in Electrical Engineering and a Master of Science degree in Systems Management from the University of Southern California, Los Angeles.

Cormany became Director of Industrial Engineering and Scheduling. He joined Convair in 1980 as Manager of Industrial Engineering after service in the U.S. Air Force. Before being named to his new post he was Director of Manufacturing Control. Cormany received both his Bachelor of Science in Aeronautical Engineering and his Master of Science in Engineering Mechanics from the University of Alabama.

Agee was named Director of Manufacturing and Material Control after being transferred from Electronics where he held the same position. Agee received his Bachelor of Science in Social Science from Wesleyan University, Middletown, Conn.

Williams has been with the company since 1946 and was appointed Director-Aircraft Product Line. He is a veteran in aircraft assembly operations and was previously Director of Aircraft Assembly for DC-10/KC-10, 767 Strut and Orbiter Mid-Fuselage Operations. He received his certificate as an aircraft technician from the Aero Industrial Technology Institute in Los Angeles.

## Pomona Submissiles Score 5 Direct Hits

Five Pomona-built Terminally Guided Submissiles, dispensed at high altitude from a Martin T-16 carrier missile, simultaneously scored direct hits on five separate tanks in a recent test.

The test took place at the White Sands Missile Range in New Mexico and proved that TGSMs can be delivered over a target area by a single carrier missile and successfully hit individual targets on the ground.

Each TGSM autonomously searches for and locks on a tank and guides to impact on the tank's heat-emitting engine compartment.

The demonstrated technologies and systems testing of the TGSMs met performance objectives required by the Office of the Secretary of Defense and the U.S. Army before going into development.



Sterling V. Starr

## Sterling V. Starr Named Deputy GM at Pomona

Sterling V. Starr, Vice President-F-111 Program Director at Fort Worth, has been named Deputy General Manager for Finance and Administration at Pomona.

Starr began his career at General Dynamics in 1953 when he joined Convair. After engineering experience on the Sea Dart, F-102 and F-106, he moved into advanced missile and launch vehicle design work. He served for three years as Chief Project Engineer on the Convair S3A design and was then V/STOL program manager.

In late 1970, he moved to the Corporate Office to direct development of the corporatewide planning and performance review process and to assume special business study and technical proposal evaluation assignments.

He became Vice President-Marketing at Fort Worth in July 1976 with responsibility for overall division product planning and for developing and coordinating the worldwide marketing functions for all Fort Worth products.

When General Dynamics initiated the F-16/79 program in February 1980, Starr was appointed Vice President-F-16/79 Program Director. He was responsible for all aspects of the aircraft's development, testing, certification and marketing.

## F-16XL Records Its 100th Flight

The first F-16XL, a highly advanced version of the operationally proven F-16 Falcon, recorded its 100th flight January 13th at the Air Force Flight Test Center, Edwards AFB, Calif.,

Lt. Col. Edwin A. Thomas, Deputy Director of the F-16XL Combined Test Force, was pilot for the 48-minute flight.

On the same day, the second F-16XL, a two-seat model, made its 34th flight.

Plans call for the two F-16XL aircraft to make a total of 240 flights at Edwards AFB.

The single-seat F-16XL was rolled out July 2, 1982 and was first flown the following day.

Purpose of the 100th flight was to measure the performance and stability of the aircraft and to evaluate controls with an air-to-surface payload.

## Top \$10,000 Award Won by R. E. Moore For HAMOTS Idea

Robert E. Moore, a Senior Engineering Specialist in Electronics' Range Systems group, received a maximum \$10,000 award for his suggestion concerning antennas used in the HAMOTS Upgrade System being developed for the Utah Test and Training Range at Hill AFB.

Moore's award, the highest that can be earned in the division's Employee Suggestion Program, resulted in a reduction of the number of Range Interrogation Data Relay Units required for the system.

Moore noted in his suggestion that the present antenna required 22 remote units to provide the coverage for the 100-mile diameter, 55,000-foot altitude range.

By replacing the standard antenna with a computer-controlled switch and three high-gain horn antennas, each unit's volume of coverage was more than doubled, and the number of units could be reduced from 22 to 16, while the coverage increased by more than 100 percent. This increased the accuracy and reliability of the system, while saving more than \$100,000.

## Convair's Goal In Cost Reduction Surpassed in Period

Third quarter results for Convair's Cost Reduction and Employee Suggestion programs show that total savings for the quarter were more than \$31 million, 82 percent above the quarter's goal of \$17 million. Total savings for the first nine months of 1982 have reached a total of \$82.5 million, 24 percent greater than the year's goal of \$66.8 million.

Major savings came from Cost Reduction Proposals submitted for Productivity Improvement and for reduction of procurement costs. More than \$30 million was saved by assignment-related cost reduction proposals in those areas during the quarter, and nearly \$80 million savings have been credited to those two areas since the beginning of the year.

In 1982, 635 adopted Employee Suggestions have been responsible for first year net savings of more than \$692,000, and have returned more than \$69,000 to the suggesters in cash and merchandise awards.

## Electronics Holds Conference on F-16 Logistics Program

More than 20 logistics specialists from Belgium, Denmark, the Netherlands, Norway and the United States met at Electronics for three days in December to discuss maintenance and support of the F-16.

The specialists visited the production facilities for the F-16 Avionics Intermediate Shop, the Depot Level Maintenance Facility and the Management Information Center, which provides daily status reports on AIS stations around the world.

# GD World

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## Data Systems Division Has Key Role in General Dynamics Products

From the factory to the front office, computers have a solid impact on how General Dynamics handles its business operations and designs and manufactures its products. Computers do a variety of important jobs. They print employees' paychecks, order parts, design hull structures and control machine tools.

The focal point for General Dynamics computer operations is Data Systems Division.

Formed 10 years ago, the division is headquartered in St. Louis and employs 2,600 people across the country. Major DSD computer operations are located at the Eastern Center at Norwich, Conn., the Central Center at Fort Worth and the Western Center at San Diego. The centers process engineering and business programs, develop computer-aided-design and computer-aided-manufacturing systems and provide software for General Dynamics' products.

As the computer age continues to develop, increasing numbers of General Dynamics products are requiring their own computer systems. Designing, programming and testing the software for these computers are becoming increasingly important activities for DSD personnel.

"Product software, the designing and writing of instructions for the computers used by our products, is one of the least known but increasingly vital products General Dynamics has," says Melville R. Barlow, Vice President and General Manager of Data Systems Division. "The original F-111s had three computers; the F-16A carries seven, and the F-16C will have 14. The same basic F-16 will use additional computers and General Dynamics software to perform a greater number of tasks. The increasing numbers of computers in our products mean an increase in

### F-16 Demonstrates Advanced Systems For C/D Versions

An F-16A, modified to test an advanced cockpit arrangement with new displays, new avionics and other weapons-delivery improvements, made its first test flight December 16th at Fort Worth.

The modified aircraft will test new equipment which will be incorporated in F-16C single-seat and F-16D two-seat aircraft under the Multinational Staged Improvement Program. F-16C/D aircraft will be equipped with beyond-visual-range radar-directed air-to-air missiles, air-to-surface acquisition systems for night and all-weather operations, an advanced programmable radar and other improved features.

The first flight of modified F-16A No. 278 was an "excellent flight with all systems operating as expected," said Dain Hancock, MSIP Program Director at Fort Worth. The aircraft is fitted with new multifunction displays, an expanded-memory fire control computer and new radio and navigation control systems that complement the finger-tip flight control and weapons-delivery features provided by the present F-16 cockpit.

The aircraft was flown to Edwards AFB, Calif., in January for additional testing and will be returned to Fort Worth later in the year for installation of the advanced APG-66 radar and other changes that will complete its modification to the F-16C configuration.

A second MSIP test aircraft, F-16B No. 82, is being modified to the F-16D configuration at Fort Worth, said Hancock.

The first production aircraft incorporating the initial MSIP capability enhancements is scheduled to be operational in late 1984.

### Dividends Declared

The General Dynamics Board of Directors on January 6th declared a regular quarterly dividend of 18 cents per share on the company's common stock and \$1.0625 on its Series A preferred stock, payable on February 15, 1983 to shareholders of record on January 17, 1983.



**Producing Software.** Designing instructions for computers in General Dynamics products, such as for the F-16 Avionics Intermediate Shops at Electronics (above), is becoming an increasingly important activity for Data Systems Division.

the complexity of the systems, but it also means that the products can perform more jobs better."

The development of software for the General Dynamics high-technology products results from the combined efforts of divisional engineering and DSD personnel. A few years ago, when there was a tremendous shortage of computer specialists, DSD trained other engineers in software, which created a cadre of employees fully qualified both as engineers in various fields as well as in computers.

"The development of computer programs is one of the more intensive, individual intellectual exercises in the world today," Barlow says. "We are very fortunate to have software engineers who are well qualified in two fields."

Through DSD, the corporation has the ability to quickly focus on high-priority projects. For example, when Convair took on a software development program for

the Ground-Launched Cruise Missile Mission Procedures Trainer (see story page 2), a team of DSD personnel who had experience on projects at Electronics and Datagraphix, as well as Convair, was formed to do the software.

"The original contract on that project was for three years, but we completed it in 14 months," Barlow says. "It was a coup for General Dynamics and the GLCM program which wouldn't have been ready for deployment this year without the trainer."

General Dynamics obtained its first digital computer in the 1950s to perform engineering calculations for Convair's Atlas program. A few years earlier, Convair employees designed and built what was then the world's largest analog computer. Since that time, the processing of data by the corporation has grown with the corporation's computer power rising from one half million instructions per

second in the 1950s, to four times that in the 1960s, to 25 times that in the 1970s, to 200 times that, or 100 million instructions per second, today.

"Our use of computers has been growing for three decades," Barlow says, "but in the past 10 years, we have seen a tremendous increase in applications. Although we were not among the first of the major companies in our industry to get into computer-aided-design and computer-aided-manufacturing in a large way, our people have made up for lost time. These systems have speeded up and lowered the cost of many of our projects. They are now being used, for example, on a large part of the design of the Shuttle/Centaur and the Medium-Range-Air-to-Surface Missile. The quality of our products has increased through tying the computer to milling machines. Our accuracies and tolerances — and therefore the quality of our products — are superior today to what they were a few years ago."

DSD also provides computer capability to General Dynamics divisions for collecting and processing data from developmental tests, analyzing engineering concepts and processing business and inventory information.

As to the future, Barlow says, "We are working on a paperless manufacturing environment which will allow parts — as they are received, worked on and assembled in the final product — to go through the entire process using computers to trace them, not with a paper trail. We are also developing an Information Network Service through which the user of information can directly and easily access a computer, tell the computer what is wanted and then obtain the result quickly."

"More and more," Barlow says, "we are working on very sophisticated software that our high technology products require. As our products need more computers and software programs to compete in this high-technology world, our ability to effectively and efficiently harness the computer to our customers' needs will determine our competitive edge."

## FW Logistics Group Helps Keep 1,300 Aircraft Flying

More than 1,300 Fort Worth-built aircraft presently are in service around the world — the largest number since World War II — and the division has responsibility for providing vital services to keep the aircraft flying.

The job for the Logistics and Support Department's 1,600 employees involves conducting maintenance training and shipping thousands of spare parts, modification kits and training equipment each month to the air forces of nine allied countries which are flying more than 860 F-16s and about 450 F/FB-111s.

More than 130 Fort Worth employees are assigned worldwide to provide support to aircraft at U.S. and foreign bases. According to Rolf Krueger, Vice President-Logistics and Support, the number varies on the customer's needs: "Normally, about 10 people deploy to a base initially," he says. "The number varies and is reduced as the base gains experience in operating and maintaining the aircraft."

"On occasion, Fort Worth personnel join with employees of General Dynamics Services Corporation when the customer wants a larger cadre of people to help introduce a new aircraft," Krueger says. "For example, there are more than 100 General Dynamics personnel in Egypt at the present time assisting the Egyptian Air Force in introducing the F-16 into its air force."

Much of the department's activity is involved in training personnel in foreign air forces to maintain the aircraft.

"Many countries do not have a training organization in their air forces as does the U.S. Air Force," says Krueger. "Our department provides a large curriculum of maintenance training to foreign customers, while the USAF provides pilot training."

In addition to training, the department prepares technical manuals using electronic graphic and text preparation.

"The base level maintenance manuals for an F-16A consist of about 250 separate books and a total of about 100,000 pages," Krueger says. "In addition to the base level manuals, at least 500 additional manuals are required for intermediate and depot level repair of failed parts."

The department also is responsible for an initial issue of spare parts when a country places an aircraft in service, while the USAF is responsible for obtaining additional parts. However, Fort Worth continues to supply special parts and modification kits and other support items to each country flying General Dynamics aircraft.

"Currently we are making about 4,000

shipments of spares, 5,000 modification kits and 700 items of other equipment each month," Krueger says.

"A successful support effort depends on a lot of people working together," Krueger says. "We must work closely with the Engineering Department on the design of hardware, with the Material Department for procurement and with the Production Department for production of the supplies and parts we need."

"We have a long-term commitment — we have to maintain our effort over the long haul, because we are responsible for supporting aircraft as long as they are in service — and that can be 25 years or more."



**Keep 'em Flying.** Supporting the more than 1,300 General Dynamics aircraft now in service worldwide, like this Strategic Air Command FB-111, is the responsibility of the Fort Worth Logistics and Support Department.



## Belgium Plans To Purchase 44 More F-16s

Belgian Prime Minister Wilfried Martens announced on February 9th that the government plans to purchase an additional 44 F-16 fighters. Belgium ordered 116 F-16s in 1975, 75 of which have already been delivered.

According to the Belgian government, the additional F-16s were selected over the French Dassault-Breguet Mirage 50 as replacement for Belgium's aging fleet of Mirage 5s.

Delivery of the newly ordered F-16s will begin in 1988. Under the terms of the F-16 coproduction agreement signed in 1975, the aircraft will be assembled at the SABCA plant near Gosselies, Belgium.

## Quincy Receives Submarine Tender Overhaul Contract

The U.S. Navy has awarded Quincy Shipbuilding a \$12,537,760 contract for the overhaul of the USS *Fulton*, a 531-foot-long, 16,500-ton submarine tender.

The USS *Fulton*, presently based at New London, Conn., is expected to arrive at Quincy in late summer 1983. The overhaul includes extensive repairs and alterations and represents 130 man-years of work. At its peak, the program will create 360 additional jobs.

The overhaul contract, as well as the accelerated construction on the recently awarded five-ship TAKX prepositioning ship program, will enable Quincy to minimize further layoffs, speed up recalls and begin its longer term manpower buildup earlier than expected.

## Attack Submarine Named after Twin Minnesota Cities

The U.S. Navy has named SSN 708, a 688-class, fast-attack submarine now under construction at Electric Boat, *Minneapolis-Saint Paul*, after the twin cities in Minnesota. Mrs. David F. Durenburger, wife of Minnesota's senior Senator, will christen the *Minneapolis-St. Paul* on March 19th in a ceremony at Groton.

No previous Navy ships have borne this joint name. However, two each have been named after the cities individually.

## Land Systems Sets M1 Tank Production Record in January

Land Systems set a record in January by producing 67 M1 Abrams main battle tanks for the U.S. Army at the Detroit Arsenal Tank Plant and the Lima (Ohio) Army Tank Plant. In addition, Detroit produced 33 M60A3 tanks for allied nations.

"The important thing about these production highs," said B. E. Ewing, Land Systems Vice President, Manufacturing, "is that they were accomplished while the plants were significantly improving quality and efficiency right along with production totals."

## Multiyear Contract Assures Long-Term KC-10 Production

Continued production of KC-10 fuselage sections by Convair was assured in January by a U.S. Air Force announcement of a multiyear purchase agreement with McDonnell Douglas for 44 additional aircraft, bringing to 60 the planned fleet of the huge aerial tanker and cargo planes.

According to Roy Gilmour, Convair's KC-10/DC-10 Program Director, this new Air Force order should cover fuselage production at Convair for the next four to five years.

Each fuselage that Convair produces is built in three sections totalling about 140

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# GD World



**Performance Praised.** The two advanced F-16XLs, which are continuing their intensive flight-test program at Edwards AFB, Calif., are shown in formation with an F-16A. In his fourth-

quarter report on operations, General Dynamics Chairman David S. Lewis said the F-16XLs "are meeting or exceeding all performance predictions."

## GD Earnings Set Record in Last Quarter of 1982

General Dynamics announced on February 3rd that net earnings in the fourth quarter of 1982 were \$64.1 million, or \$1.17 per share, up 97 percent over the \$32.6 million, or 60 cents per share, earned in the fourth quarter of 1981. Sales in the 1982 fourth quarter were \$1.8 billion compared to \$1.2 billion in the period a year earlier.

"Earnings in the fourth quarter were the highest of any quarter in the company's history," said David S. Lewis, Chairman and Chief Executive Officer. "The company ended the year with a record funded backlog of \$15.1 billion. Funded and unfunded backlog stood at \$18.4 billion compared with \$10.9 billion a year ago."

Results in the 1982 quarter included provision of \$6.9 million after taxes, or 13 cents per share, to cover anticipated costs associated with the closing of an underground coal mine. The 1981 fourth quarter results included write-offs of \$38.2 million after taxes, or 71 cents per share, to cover cost overruns and excess overhead at Electric Boat and Quincy and certain inventory adjustments in the commercial group. In addition, operations which have since been discontinued had losses of \$4.9 million, or 8 cents per share, in the 1981 fourth quarter.

Earnings from continuing operations for the full year of 1982 were \$160.5 million, or \$2.92 per share, and losses from discontinued operations totaled \$27.7 mil-

lion, or 51 cents per share. In 1981, total earnings for the year were \$124.1 million, or \$2.25 per share, including losses of \$23.2 million, or 42 cents per share, experienced by those operations which have since been discontinued. The discontinued operations consisted of the company's telecommunications subsidiaries, the disposition of which was completed by October 1, 1982.

The 1982 full-year earnings were adversely affected by the company's decision in the second quarter to write off \$56 million, or \$1.03 per share, to cover anticipated cost overruns on two submarine construction contracts at Electric Boat and to cover unabsorbed overhead costs and cost overruns on the construction of a coal collier at Quincy.

Sales from continuing operations during 1982 were \$6.2 billion compared to \$4.8 billion in 1981. Total sales in 1982 were \$6.4 billion compared to \$5.1 billion in 1981.

"One of the positive accomplishments in 1982 was the further strengthening of the corporation's balance sheet to obtain the liquidity desired to better face the current difficult economic environment," Lewis said.

Total debt, short-term and long-term as well as capitalized leases, declined to \$89 million at December 31, 1982 from \$166 million at the beginning of the year. At the same time, the investment of available cash was \$98 million. These gains were made after payment of the \$336 million acquisition price of Chrysler's tank operation and the contribution of \$145 million from the disposition of the telecommunications units. Interest expense declined throughout the year as borrowings were reduced. The corporation's projections indicate further significant improvement in available cash during 1983 and beyond.

"Throughout 1982, results were led by Fort Worth for the third consecutive year," Lewis said.

Ahead-of-schedule and on-budget performance on the very important F-16 Falcon fighter program continued, with 271 of these versatile aircraft being delivered from the production lines at Fort Worth, Belgium and Holland, he said. At year-

end a total of 861 F-16s had been delivered to the air forces of eight countries: the United States, Belgium, Denmark, the Netherlands, Norway, Israel, Egypt and Pakistan. Current planning calls for production of 2,100 more F-16s to meet the requirements of these air forces and to fill initial orders placed by Venezuela and Korea. Production schedules for 1983 call for the delivery of 243 Falcons, including the first of the 24 ordered by Venezuela.

Lewis said that the program to incorporate advanced avionics systems in F-16 versions to be delivered starting in late 1984 was progressing smoothly. "These systems will enable the F-16 to maintain its weapon system advantages as the world's premier fighter-attack aircraft for years ahead," he said.

Flight testing of the F-16XL, an advanced version of the Falcon with a cranked-arrow wing, began in midyear with the first flight of the single-seat prototype. The two-seat version joined the very intensive flight test and evaluation pro-

*Continued on Page 4*

## RAM Hits Drone In 3rd Successful Over-Water Test

For the third consecutive time in an over-the-water test, a Pomona RAM missile has successfully scored a direct hit on a remotely controlled drone representing a sea-skimming antiship missile.

The test took place at the Pacific Missile Range, Calif., to evaluate RAM performance in a sea environment. Additional over-the-water tests are scheduled later this year.

RAM is being developed by Pomona under the sponsorship of the U.S. Navy and the governments of the Federal Republic of West Germany and Denmark.

Previous tests at White Sands Missile Range, N.M., have also verified RAM's fundamental performance characteristics and resulted in several successful interceptions of drone targets.

RAM utilizes subsystems from two Pomona Division products, Phalanx and Stinger.





**Historic Occasion.** USAF Lt. Gen. William R. Nelson, Commander of the 12th Air Force, addresses the crowd at Luke AFB, Ariz., on February 2nd, during the ceremony in which the F-16 Falcon was formally placed into service at the advanced tactical fighter training base.

## F-16 Described in "Superlatives" As It Begins Service at Luke AFB

During a ceremony in which the F-16 was called the "worldwide standard for excellence in fighter aircraft," the Falcon was formally put in service with the 58th Tactical Training Wing at Luke AFB, Ariz., on February 2nd.

"This is an exciting day in Luke's 42nd year of existence," Col. Malcolm F. Bolton, Commander of the wing, told a crowd on hand at the event.

Luke is the Tactical Air Command's largest advanced tactical fighter training base. Aircrews receive instruction for the F-5E, F-15, F/TF-104G and now the F-16. In the past, pilots at Luke have been taught to fly P-40s, F-84s, F-86s, F-100s and F-4s.

"There is no doubt that General Dynamics has developed an exciting new concept . . . and few will argue that it is the worldwide standard for excellence in fighter aircraft," Col. Bolton said.

"The Falcon is extremely effective in the air-to-ground role, and it is a true swing fighter in that it is remarkable in the air-to-air mission. Everything about the F-16 can be expressed in superlatives. It is an extraordinary aircraft," he said.

USAF Brig. Gen. Henry Canterbury, Commander of the 26th Air Division at Luke, and Lt. Gen. William R. Nelson, Commander of the 12th Air Force, also praised the Fort Worth-built aircraft.

"The Falcon is American industry at its best," said Gen. Canterbury. "It embodies all the advanced technologies and is an all-around champion performer in all three of its assigned roles, air-to-air, nuclear strike and air-to-ground."

Commenting on the base's history, he noted that "some of the best pilots in the U.S. Air Force have been trained here. We still have the experience, the instructors, the ground crews, the F-16 and the other ingredients that will keep us the best in the world."

Gen. Nelson, whose headquarters is at Bergstrom AFB, La., said that the introduction of the F-16 makes Luke, "the largest and most modern equipped fighter base in the world."

He added that Luke is the third base in the 12th Air Force to fly the F-16. The other two are Hill AFB, Utah, and Nellis AFB, Nev.

"It is hard to explain this to you civilians who are with us on this historic occasion," Gen. Nelson said, "but to aviators like us, just looking at this aircraft makes the blood run faster."

One of the civilians in the audience was Dr. Ted Webb, Fort Worth Vice President—F-16 Programs.

Gen. Nelson singled him out, saying, "Dr. Webb, to you and your organization, you have our obvious thanks for producing this fine aircraft."

Webb answered, "It gives us a great deal of pride to deliver quality aircraft to the U.S. Air Force. It is certainly our pleasure to be a part of this ceremony."

At the end of the remarks, two F-16s took off on training sorties.

"This marks the beginning of the Falcon era at Luke," Col. Bolton said over the noise of the engines and the applause of the crowd.

## Forward Looking IR System Flown in F-16 Test Mission

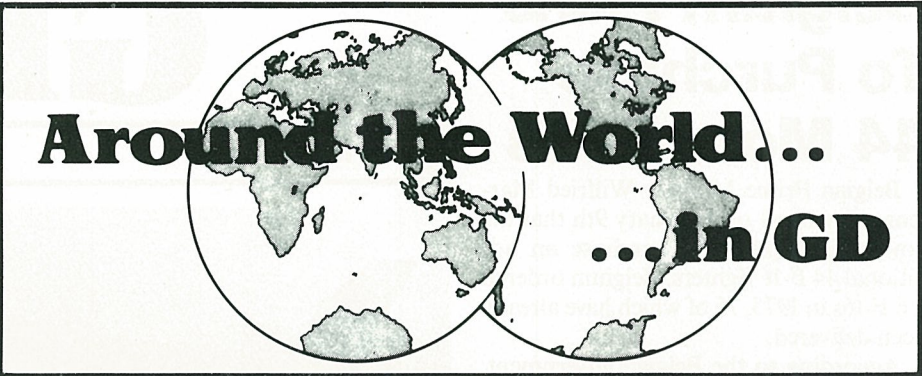
A Fort Worth F-16 multimission fighter recently successfully flew a night mission with a forward looking infrared (FLIR) image projected onto the pilot's head-up display.

The tests confirmed the night viewing capabilities of the FLIR. They were conducted at Edwards AFB, Calif., as part of the preproduction evaluations of the LANTIRN HUD being developed for use on the F-16 and A-10 aircraft.

Since flight testing of the full scale de-

velopment LANTIRN pods on the F-16 is not scheduled to begin until the latter part of 1983, an interim FLIR was used to investigate the video imaging capability of the HUD and to obtain data on low altitude, night operation.

The FLIR video image for these test flights was generated by a pod-mounted infrared system developed by General Dynamics and Texas Instruments. It attaches to the F-16's LANTIRN hard points on the inlet.



**CHQ:** Christopher Hansen was promoted to Corporate Director Administration-Government Relations . . . Freda Monk to Corporate Planning Operations Manager . . . Paul W. Steckley joined as Corporate Manager, Financial Planning . . . Jerome Sonnabend was promoted to Chief Corporate Pilot . . . Anita True to Corporate Manager, Administration-Government Relations.

**Fort Worth:** R. J. Allen was promoted to Engineering Staff Specialist . . . W. Armann Jr. and R. M. Burgess to Inspection General Supervisor . . . T. E. Arwood to Senior Logistics Supply Analyst . . . D. T. Ash to Director of Production Planning & Control . . . D. A. Barfield, E. Felczak Jr. and R. S. Shelton to Industrial Engineering Supervisor . . . R. G. Berry to Electronics Supervisor . . . R. E. Briggs to Director of Tooling Design and Manufacturing . . . T. B. Brown to Senior Quality Assurance Engineer . . . M. R. Cameron and G. G. Wood to Superintendent . . . C. L. Carlisle to Manager of Fabrication Control . . . N. A. Durando, R. D. Heath and Y. Kim to Offset Manager . . . G. I. Evans to Manager, F-16 Programs . . . W. H. Foley to Project Engineer . . . W. K. Gardner to Tooling Supervisor . . . B. A. Garrett, H. Haberzettle and M. H. Kays to Technical Group Supervisor . . . R. W. Giese to Project Coordinator . . . E. L. Gomer to Manager, F-16 International Field Evaluation/Engineering . . . T. B. Hall Jr. to Engineering Program Manager . . . J. L. Hart to Engineering Chief . . . D. C. Henry to Manager of Contracts . . . M. D. Homeyer, P. E. Kovacs, P. J. Podmers and R. W. Rice to Field Service Engineer . . . V. J. Kane Jr. to Change Proposal Supervisor . . . W. R. Kayl to Engineering Administrative Group Supervisor . . . G. Payblas to General Foreman . . . D. L. Reed to Director-Manufacturing Development . . . W. B. Sconyers to Engineering Program Manager . . . J. R. Sullivan to Logistics Engineer . . . L. L. Tabaczka to Traffic Foreman . . . R. W. Westlake to Fabrication Manager . . . B. S. Wilson to Material Supervisor.

**Pomona:** Cheryl A. Crisp was promoted to Administrative Services General Supervisor . . . Guy Halliday to Engineering Group Supervisor . . . Donna J. Marks and Patricia A. Morris to Purchasing Agent . . . Newell F. Young Jr., Alan A. Logsdon, Robert J. Nelson, William H. Scannell and Jimmy W. Garbarino to Group Engineer . . . Carol A. Banke to Staff Assistant . . . Joanne G. Boyajian to Administrative Services Supervisor . . . Jeanne Collins to Project Administrator . . . Dana D. LaGrande and Timothy E. Foster to Material Liaison Representative . . . John A. Phelps to Quality Assurance Project Administrator . . . Edgar M. Roebuck to Manager, Production Support . . . James M. Thomas to Senior Project Engineer . . . John G. Verret to Superintendent . . . Albert M. Douglas to Laboratory Group Engineer . . . Bruce L. Moore to Senior Project Administrator . . . Todd D. Peterson to Electronics Engineer . . . Raymond R. Ranney to Logistics Representative . . . Jeffrey M. Snyder to Material Control Supervisor . . . Joseph A. Van Fossen to Manufacturing Group Engineer.

**Data Systems:** At Eastern Center, R. Adamczyk, R. Doyle, R. Whitcomb and R. Ingersoll were promoted to Supervisor, Data Systems . . . S. Savtelle to Chief, Data Systems . . . P. Gilberto to Chief, Data Administration . . . R. Schulke and W. Douglas to Supervisor, Operations Services . . . S. Wayne to Supervisor, Key Processing . . . R. Miller to Senior Production Control Analyst . . . At Central Center, E. J. Evers and L. D. Mason to Chief, Engineering Software . . . At Western Center, W. J. Erndt to Software Design Specialist . . . I. A. Holthus to Manager, Operations Services . . . R. R. Irwin to Manager, Technical Services . . . D. P. Marshall to Manager, Data Management Services . . . T. R. Rodgers Manager Teleprocessing Support . . . G. G. Rosbrook to Director, Computer Services . . . W. C. Sangermano to Chief, Production Control.

**Electronics:** Boyd E. Burnett was promoted to Quality Control Engineer . . . Thelmon Copeland to Manager of Manufacturing . . . Lawrence B. Levine to Manufacturing Engineer . . . Steven A. Moyes to Operations Section Head . . . Kenneth Ponchetti to Production Test Section Head.

**Datagraphix:** Donald J. Bergstrom was promoted to Design Specialist . . . Linda J. Buhrig to Supervisor, Operations Administration . . . David R. Carlson and Jerold A. Owings to Production Control Supervisor . . . Billy J. Knight to Logistics Planning Specialist.

**Convair:** Susan P. Addy was promoted to Operations Management Intern . . . Joseph V. Davis Jr., David E. Lawrance, Raymond W. Stoker to Group Engineer . . . Richard Hull to Supervisor, Quality Assurance . . . John W. McCreery to Logistics Specialist . . . Robert J. Blair to Logistics Supervisor . . . Elizabeth Gray to Publications Editor . . . Alan E. Luckey to Manufacturing Operations Supervisor . . . Robert J. McFarland to Accounting Supervisor . . . Carlton Pereira to Chief, Quality Assurance . . . Don S. Schattschneide to Engineering Specialist . . . Michael A. Short to Tooling Supervisor . . . Charles E. Weingartner to Chief, Manufacturing Engineering . . . Brent C. Higbee to Engineering Specialist . . . Andrew L. Keller to Manager, Contracts . . . Dennis G. McColl to Supervisor, Industrial Engineering Operations . . . Edward G. McGraw III and Lawrence M. Mitchell to Operations Supervisor . . . Norman E. Tipton to Manager, Integrated Logistics Support Engineering . . . Thomas J. Underwood to Group Supervisor . . . Christine A. Clark to Financial Supervisor.

**Electric Boat:** William Lennon and Tod Moser were promoted to Nuclear Test Supervisor . . . Kenneth Michaud to Group Trade Planner . . . William Correll to Chief of Test . . . Mark Gaynor to General Foreman . . . Dennis Urra to Supervisor, Equipment Control Center . . . At Quonset Point, John Wilcox to Administrative/Control Coordinator . . . Edward Gagnon to General Foreman II.

**Land Systems:** David Berggren and Norman Pence were promoted to Clean Team Supervisor . . . Andrew Pusey to Material Handling Foreman . . . John Rhoads to Proposals Chief . . . Jerome Lovejoy to Product Sales Supervisor . . . Benjamin Porter to Chief, Proposal Development . . . Scott O'Dell to Skilled Maintenance Supervisor . . . Auro Paglia to Purchasing Chief . . . Richard Foster to Price Analysis Supervisor . . . Richard Braun to Chief, Procurement Systems . . . Gerald Quilling to Program Manager A . . . Gerald McCook to General Foreman, Skilled Maintenance . . . Wayne Lockwood to Logistics Engineering Group Supervisor . . . Thomas Kauffmann to Machining General Supervisor.

Savings and Stock Investment Values				
Salaried	Dec. 1980	Dec. 1981	Dec. 1982	
Government Bonds	\$ 2.4964	\$ 2.7892	\$ 3.3649	
Diversified Portfolio	2.1720	2.0894	2.5504	
Fixed Income	1.1547	1.2834	1.4313	
Hourly				
Government Bonds	2.4943	2.7866	3.3630	
Diversified Portfolio	2.2163	2.1335	2.6045	
GD Stock	\$42.7500	\$24.5000	\$33.0000	



## "Donor Alert"

# Quonset Point Welding Supervisor Sets Up a Lifesaving Hot Line

Victims of disease, accident or birth defects across the nation who are awaiting vital organ transplants are now closer to a new lease on life — thanks to the efforts of an employee at Electric Boat's Quonset Point (R.I.) facility.

Ray Coleman, a welding supervisor, has founded a nonprofit organization called "Donor Alert," which provides the first national "hot line" telephone number to call should anyone in the country locate a possible organ donor for the dozens of patients across the U.S. who need an organ donation.

An organ donor is a person suffering clinical brain death (the brain has ceased to function) usually because of a severe accident, but whose heart is still beating due to mechanical support.

The toll-free, 24-hour-a-day number — 1-800-352-7001 — reaches a Providence, R.I., answering service, which, in turn, contacts a "donor coordinator" in the calling area. The donor coordinator goes to the hospital emergency room, or wherever the donor is located, to follow through on the possibility. (In Rhode Island, the number is: 401-331-9500.)

Before the 800 number went on-line in mid-January, a person who had identified a possible donor had to call regional numbers across the country which generally are not publicized and which differ across the nation. Anyone can still call those numbers, but Donor Alert now makes the contact much easier.

Coleman says he had two reasons for setting up the network. The first is that three-year-old Justine Pinheiro, the daughter of his friend, Joe Pinheiro, an electrician at Quonset, desperately needs a liver transplant. "I watched Joe and Debbie Pinheiro go through a lot of frustration in getting the word out about Justine," says Coleman, "and I wanted to help them."

The second reason is what Coleman calls the "gap" in the alerting process.

## Replacing Computer's Obsolete Language Earns Suggestor \$2,429

Three Convair employees shared nearly \$6,800 awarded for their suggestions.

Two of the suggestions were computer-related. One called for the replacement of an obsolete programming language, while the other used the computer to generate graphic status displays from information already on hand.

Linden T. Brooks, an Associate Engineer in Space Test Planning and Data, received \$2,429 for his suggestion to convert a company-developed and -modified computer program into Fortran computer language. He pointed out that early programming for the Instrumentation Master Files had been modified several times over the 20 years of its use as the company changed models of computers. Each modification added a separate layer of instructions, but only someone who had been involved with the original program could adjust it. When the language of the program was changed to Fortran, nearly everyone working with computers could understand what the programs were to do, and machine time and costs were reduced.

Mac Lee, a Program Control Analyst, was given the task of reducing progress-to-milestone data to graphic form for weekly program office reviews. After several weeks of making these graphs from the raw tabular data, he decided to investi-

"Very few people, not even medical personnel in the emergency room of a hospital, want to approach grieving relatives to ask about an organ donation," he explains. "It's a very hard thing to do."

"But there's a group called the National Association of Transplant Coordinators that does just that," Coleman continues. "The group has been operating with just the regional numbers, and Donor Alert can help them. We'd also like to train other people to become donor coordinators."

To implement his idea, Coleman worked tirelessly for two weeks — visiting lawyers to get papers drawn up and filed, talking to telephone company officials about installing the new number, lining up an answering service to handle the calls and locating a national hospital directory to enable him to match coordinators with hospitals.

That wasn't all — he also talked with NATCO officials, who were very pleased with his idea. In addition, as a former Warwick, R.I., police officer, Coleman obtained permission from officials there to notify every police department in the country, via the national police wire, about the group and the number.

"Policemen at accident scenes are usually the first to see whether there's a possibility of a donation," he says. "I figured if they're aware of the number, we'd be that much closer to getting organs quicker." Coleman says the group has already received calls from police officers who want to be coordinators.

Here's how Donor Alert works: Someone, perhaps a police officer on the scene of an accident, identifies a possible donor. He calls the 800-number, which rings at the answering service, Business Secretarial Exchange, Inc. in Rhode Island. The service then contacts the donor coordinator in the area involved, who goes to the hospital and talks to relatives or someone, in any case, about the donation.

gate development of a way to have the graphs drawn by machine.

With assistance from the Western Center of Data Systems Division, a translator was designed which reflected the raw data in a new format and also generated the graphs and charts. Lee was awarded \$1,892 for his suggestion, which also saved the need for additional manpower to make the charts.

R. I. Garrett, a Precision Welder at Air Force Plant 19, earned \$2,460 for his suggestion concerning deburring operations on the Large Coil Program. Garrett noted that the deburring operation involved two people and the use of a wire wheel, and that manual followup was required for difficult areas. Often, the entire process line was stopped for deburring.

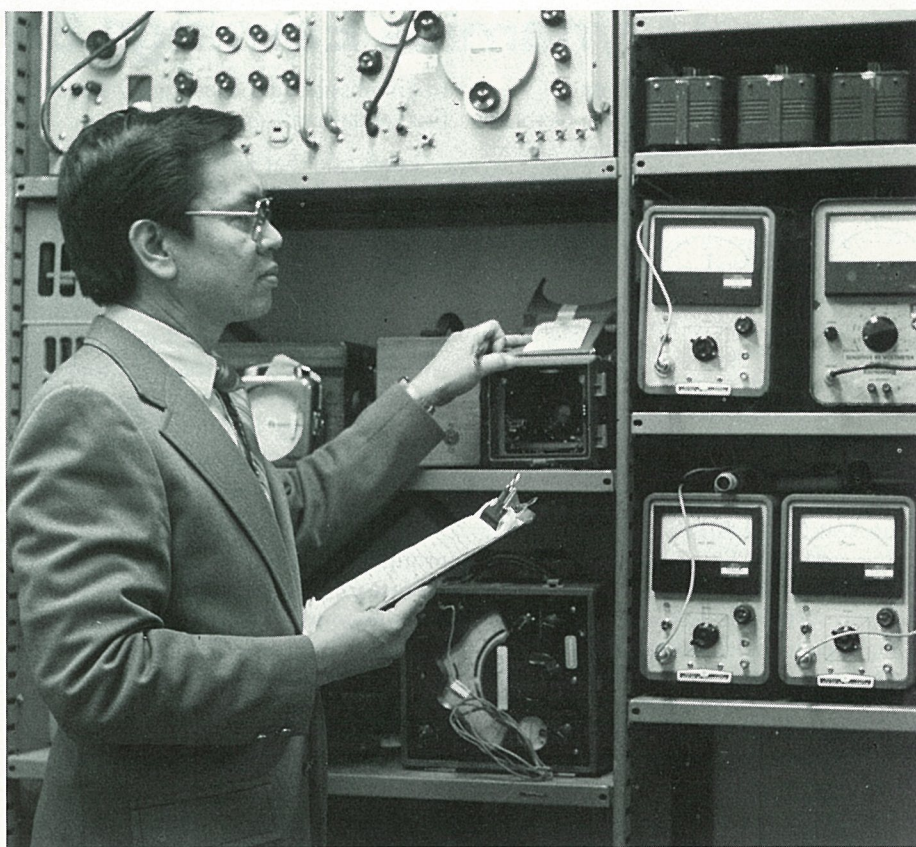
By use of a sandblasting machine, the deburring was accomplished continuously, at a savings of 1,926 hours of labor.

## "Simple" Idea Brings Employee \$5,900

A recent suggestion award at Convair shows how simple ideas can lead to savings for the company — and cash for employees.

A.J. Halyburton, Jr., a Duplicating and Profiling Machinist at Plant 19, was awarded \$5,900 for his suggestion to machine Boeing 767 strut skin panel assemblies in-house, rather than send them out for chemical milling.

Previously, an outside vendor performed initial milling, and the panels were finished and reworked to "true" dimensions upon their return. By eliminating the outside source and using an existing profile router in place at Plant 19, first year savings on the strut skins came to \$59,238 after the necessary tools were made.



**Classroom Aids.** Ray Reynante, Standards Calibration Support Manager for Electronics, examines test equipment before it is donated to Serra Junior/Senior High School as part of the division's support for the "Adopt-a-School" program.

## Electronics and Its Management Club Work to Support Local High School

Electronics Division and its National Management Association chapter have entered into a partnership with Serra Junior/Senior High School in San Diego under the "Adopt-a-School" program.

The goal of the program is to bring community groups and industry together with schools to increase mutual awareness and to engage in educational and social activities that are mutually beneficial. The program is run by the San Diego Unified School District and other school districts in the area.

Electronics and Serra have several projects. First, in seminars on career planning

and preparation, Electronics employees will teach Serra students how to interview, how to write a resume and how to fill out job applications.

In addition, presentations on various careers will supplement information available at the Serra career library. Students will tour various Electronics facilities, and some may receive the opportunity to observe or work directly in an area of interest to them.

In another part of the joint program, an after-school course in programming the Apple II computer will be conducted for students.

Finally, surplus and salvageable materials and equipment have already been donated by Electronics to supplement many of the school's classes. Most notably, the electronics class has benefitted from donations of electronic equipment and parts.

Kimberly Grucza, coordinator of Electronics' "Adopt-a-School" program, says the program "is a valuable opportunity for the students to become involved in a working environment and learn how their current studies apply to future careers."

## Electronics Makes Key Appointments In Quality Functions



Peabody



Nicholson

M. A. Peabody has been named Director of Quality Assurance for Electronics Division, and R. H. Nicholson has been appointed to a newly-created position as Director of Quality Liaison.

Peabody, who has been Director of Productivity, has been with General Dynamics since 1977, having served previously as Director of Plant Engineering and Director of Manufacturing and Industrial Engineering. He will continue to act in the productivity position for the present.

Peabody has a Bachelor of Arts degree in Business from Long Beach City College, a Bachelor of Laws degree from La Salle University, a Master of Arts in Human Behavior from United States International University and a Master in Business Administration degree from National University.

Nicholson has been with General Dynamics since 1940, serving in a succession of inspection and quality assurance positions at Convair until being named Manager of Quality Control at Electronics in 1967. In 1971, he was named Director of Quality Assurance. In his new position, he will have responsibility for liaison with other General Dynamics divisions and with customers and subcontractors.

Nicholson received an associate degree in quality control from San Diego Junior College, his Bachelor of Technology from Texas State Technical Institute and a Master of Technology from National University.

## Three Appointed To Management Positions at Convair

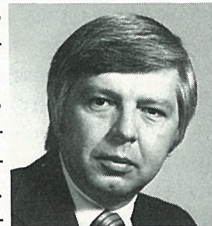
Three additional appointments within Convair's Operations Department have been announced by Richard E. Adams, General Dynamics Executive Vice President-Aerospace.

J.L. Stelmah was appointed Director-Operations Administration, L.R. Imbimbo was appointed Manager of Plant 19 and C.E. Scott was appointed Manager-Operations, Night Shift. All will report to K.S. Lake, Convair Vice President-Operations.

Stelmah had been Director of Cruise Missile Production since 1979 and had come to that post from Pomona. He first joined General Dynamics in 1961 and, except for a brief period in 1975, has been with the company since that time. He holds a Bachelor of Science degree in Administrative Science from Pepperdine University.

Imbimbo was Operations Superintendent in DC-10 production. He has been with Convair since 1952 in various operations and assembly assignments.

Scott was Superintendent of the Machine Shop. He joined Convair in 1966 after 11 years in the U.S. Navy with the nuclear submarine program.



Stelmah

# GD World

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G. Alexander Smith



# General Dynamics Earnings Set Record in Last Quarter of 1982

*Continued from Page 1*

gram at Edwards AFB, Calif., in October. "During 156 flights to date, these aircraft have displayed substantial increases in range and payload capacity and are meeting or exceeding all performance predictions," Lewis said.

Sales and earnings at Convair, Pomona and Electronics were up for the fourth quarter and the year as development and production levels continued to build on a wide range of important defense programs. Convair's Tomahawk cruise missile programs moved forward with intensive effort devoted to the very high-priority Ground-Launched Cruise Missile for the U.S. Air Force and the Sea-Launched Cruise Missile for the U.S. Navy. Tactical missile and gun systems in full scale production at Pomona include the Standard family of surface-to-air missiles for the U.S. Navy and the navies of several allied countries; the Phalanx close-in gun system for ship defense; the Sparrow radar-directed air-

to-air missile, and the Stinger shoulder-fired anti-aircraft missile system.

Lewis said that prospects for the marine group have brightened considerably. Electric Boat delivered the second Trident submarine, the *Michigan*, during the year and two 688-class ships, the *Baltimore* and the *City of Corpus Christi*. The division's funded backlog increased to \$4.6 billion with the receipt of contracts for four additional fast-attack submarines and two Tridents during the year. Electric Boat now has eight Trident and eleven 688-class submarines under contract.

"The Trident program continues to be profitable, as are the contracts covering the last six 688s. We believe that the write-offs previously taken will be adequate to cover costs to be incurred on the other five of the 688s," Lewis said.

Quincy Shipbuilding won Navy orders for the construction and charter of five TAKX prepositioning supply ships which

will support the Rapid Deployment Force. The TAKX award increased Quincy's backlog from \$25 million to \$792 million and will result in a substantial increase in shipyard employment over the life of this program. "Winning this program was vital to the future of Quincy," Lewis said.

The company's Land Systems Division, the defense subsidiary purchased from Chrysler in March 1982, made a significant contribution to sales and earnings in its nine months of operation as a General Dynamics unit. During calendar year 1982, a total of 512 M1 main battle tanks were delivered to the U.S. Army, and Land Systems has reached the scheduled production rate of 60 per month. The M1s are performing extremely well in Army operational units in the U.S. and Europe. Land Systems continued production of M60-series main battle tanks for export to Egypt and Jordan, with a total of 379 being delivered in 1982.

Lewis said that with the disposition of the telecommunications operations, the company's commercial activities are now concentrated on natural resources and information systems.

The resources operations, Material Service, Marblehead Lime and Freeman United Coal Mining, continued to be affected by the depressed national economy during the year. Freeman, after providing for the anticipated closing costs of its old Orient 3 mine, and Marblehead recorded losses in the fourth quarter. Overall, however, the resources group was profitable for the year and is in a strong position to rebound as the economy improves.

Sales and earnings at Datagraphix were up over 1981 with prospects for continued improvement as a result of the growing requirement for storage and recall of computer data by use of computer output microfilm systems, Datagraphix' major product line.

## Pomona Builds Integrated Circuits to Maintain Competitive Edge

Keeping pace with the rapidly evolving advances in technology is vital to General Dynamics' future, and the security of that future is being helped in part by the new Complementary Metal Oxide Semiconductor Laboratory at Pomona. The Laboratory designs and fabricates custom integrated circuits for Pomona's high technology products.

"Our CMOS Laboratory is developing parts that are unique to our weapon systems," says Reginald G. Low, Pomona Vice President for Research and Engineering. "The CMOS integrated circuits are proprietary, custom circuits that are peculiar to our needs and provide us with the competitive edge. The laboratory offers us the opportunity to continue research into integrated circuits for our future products, as well as conduct research in

basic technology."

The \$2.5-million laboratory, which opened last August, is currently producing integrated circuits for the Stinger-POST missile and will support advanced development programs such as the Terminally Guided Submunitions and the RAM missile.

Metal oxide semiconductors have become very common electronic devices. They serve as the heart of many inexpensive, mass-produced products such as electronic wrist watches, which operate for long periods of time on the energy stored in a small battery. The low power requirement has led CMOS technology to dominate the field of large-scale integrated circuits, single-chip microprocessors and semiconductor memory chips.

CMOS circuits are increasingly essential to the weapon systems General Dynamics builds to meet stringent military demands. Those requirements include package integrity under enemy attack, increased electronic processing speed, greater computational ability, greater reliability, more electronics in less volume and new approaches to integration and packaging.

Manufacturing CMOS circuits is a complex process. The circuits are based on the principles of semiconductors which are electronic devices having properties ranging between the high conductivity of metal and the low conductivity of insulators. Metal oxide semiconductors can be "N-channel" in which electrons are used to conduct electric current, or "P-



**Future Technology.** Paul Emielita (left), Anne Waller and Gary Webster measure the masking insulator oxide thicknesses on chips in Pomona's Complementary Metal Oxide Semiconductor Laboratory. As a speck of dust can short out a circuit, cleanliness demands are strict in the area.

channel" which use the absence of electrons, or holes, to conduct current. Complementary metal oxide semiconductors combine both N- and P- channels in the same circuit.

The task of manufacturing CMOS integrated circuits at Pomona is handled by the nine scientists and engineers assigned to the 5,000-square foot laboratory. Tolerances go down to millionths of an inch, and a speck of dust or dirt can ruin a circuit. To help maintain a clean environment, the personnel in the laboratory wear special suits and look like spacemen as they work.

CMOS fabrication is a multi-step process that consists of seven or more mask layers. Each mask layer is created from an integrated circuit design through the use of computer-aided techniques. Employing highly precise computer-controlled optical equipment, these designs are then fabricated into masks. The mask layers are formed on a silicon wafer using photolithographic printing techniques. Additional processing creates the semiconductor device regions between each mask layer.

After the fifth masking operation, which provides access to the device regions, metal is applied over the entire wafer. An additional masking step removes the unwanted metal, leaving only metal strips which are the circuit interconnections.

Pomona's ultimate goal is to be able to supply CMOS chips to other General Dynamics divisions. To build this capability, Pomona and the University of Southern

California have developed a program to train CMOS designers for the entire corporation. So far, 23 scientists and engineers have completed the class.

"A measure of our success will be how well we can use the technology being developed in our laboratories," says Bill From, Section Head of the CMOS Laboratory. "We want to be competitive in electronics systems, and our new CMOS Laboratory is a good start. It is a key area; the significance of CMOS is that we can apply what we are doing immediately."

"Eventually, other divisions will be able to utilize this technology and design their own chips, then send the designs to Pomona for production in the CMOS Laboratory," he says.

## USAF Thunderbirds Post 1983 Schedule

The F-16 Falcon-equipped U.S. Air Force Air Demonstration Squadron, known as the Thunderbirds, has announced its schedule for 1983. The schedule includes a number of shows near General Dynamics facilities:

**April 30th:** Carswell AFB, Fort Worth, Tex.

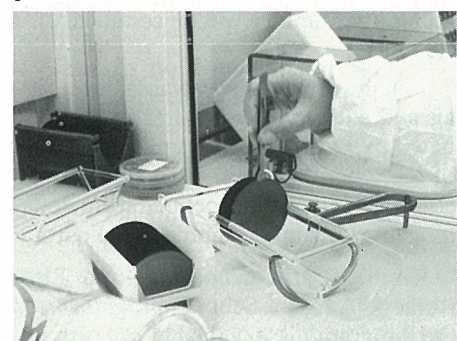
**May 13th-14th:** Andrews AFB, Washington, D.C.

**June 11th:** Scott AFB, Belleville, Ill., 18th Chantute AFB, Rantoul, Ill.

**July 16th-17th:** Chicago; 30th: Hanscom AFB, Bedford, Mass.

**August 17th:** Mansfield, Ohio

**September 25th:** George AFB, Victorville, Calif.



**Delicate Wafers.** Silicon wafers are placed onto a diffusion carrier prior to introducing phosphorous impurities into the semiconductors to modify their electrical properties.

## Pakistan Air Force Ceremony Marks Arrival of First Six F-16s

A ceremony marking in-country delivery of the first six of 40 F-16s purchased by the Pakistan Air Force was held at Sargodha Air Base on January 27th.

During the ceremony, President Gen. Mohammad Zia-ul-Haq told the members of Pakistan's No. 11 Squadron, who will operate the Falcons, that their country has given them the privilege of maintaining and flying a fleet of aircraft that is incomparable in terms of combat capability.

"Train hard, plan well and integrate carefully with the rest of the Pakistan Air Force and also with the other Armed Forces, so that this potent weapon will prove to be a strong deterrent to any encroachment upon the country's national sovereignty and territorial integrity," the President said. "Defense preparedness is a prerequisite for peace."

Other officials of Pakistan's government who attended the ceremony included: Defense Minister Mir Ali Ahmad Talpur; Gen. Iqbal Khan, Chairman of the Joint Chiefs of Staff; Air Chief Marshal Anwar Shamim, Chief of the Air Staff; Gen. Sawar Khan, Vice-Chief of the Army Staff, and Admiral Karamat Rehman Niazi, Chief of Naval Staff.

Zia expressed gratitude to the U.S. Air Force for technical and professional assis-

tance given to Pakistan and to General Dynamics for its efforts in meeting the delivery schedule.

Earlier, welcoming the President to the ceremony, Air Chief Marshal Shamim said the F-16s not only add new capability to the country's Air Force, but reflect that the PAF was able to quickly absorb the aircraft's advanced technology. PAF officers completed their training in approximately a year, he noted.

Shamim said addition of the F-16s is a source of pride for the PAF.

Following the speeches, Wing Commander Shahid Javed displayed the Falcon's maneuverability in an aerial demonstration, performing 360-degree rolls, 9-g turns and maximum-power acceleration at low altitude.

The United States was represented by Ambassador to Pakistan Donald I. Spiers; the U.S. Air Force was represented at the ceremony by Col. S.B. Hudson, Chief of the Office of the Defense Representative, Pakistan.

Representing General Dynamics were John C. Tibbs, Managing Director of Overseas Programs for General Dynamics Services Company, and Dick Steves, Fort Worth's Pakistan F-16 Program Director.



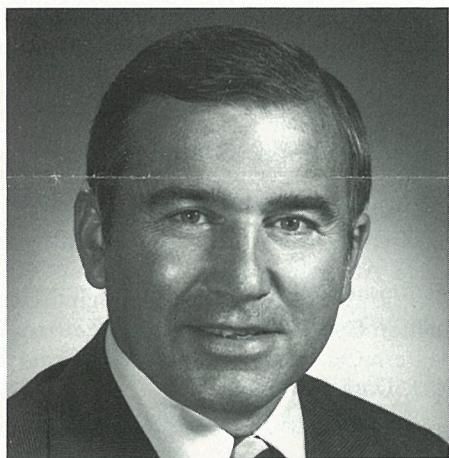
## Truxell Named V.P. - Gen. Mgr. At Land Systems

Robert W. Truxell has joined General Dynamics as Vice President-General Manager, Land Systems Division. Truxell has been elected a Corporate Vice President by the General Dynamics Board of Directors.

Truxell, who retired from General Motors Corporation after more than 40 years of service, will have responsibility for all operations of Land Systems, which produces main battle tanks and other defense equipment for the U.S. Army and several allied countries.

Truxell, 58, who joined General Motors in 1942, was Corporate Vice President and General Manager Truck and Bus Manufacturing Division. From 1975 to November 1981, he was Vice President and General Manager GMC Truck and Coach Division.

After graduating from the General Motors Institute in 1949 with a Bachelor of Science degree in Industrial Engineering, Truxell held positions of increasing responsibility in the Oldsmobile Division. He served as Corporate Director Manufacturing Development-General Motors Technical Center from 1969 to 1971. From 1972 to 1975, he was General Manager-Delco Moraine Plant, Dayton, Ohio.



**Robert W. Truxell**

He is a member of the Society of Automotive Engineers and the Engineering Society of Detroit and serves on the Executive Committee of the Western Highway Institute.

After a reasonable transition period, General Dynamics President Oliver C. Boileau, who has headed the management team at Land Systems since the defense operation was acquired from Chrysler in March 1982, will return to take up his corporate responsibilities at St. Louis.



**Final Checks.** Several Tomahawk cruise missiles undergo final test and checkout at Convair's Kearny Mesa Plant. The Navy will deploy sea launched Tomahawks on more than 100 submarines and surface ships. The Air Force are scheduled for deployment in Western Europe later this year.

## A Fort Worth First... Computers Used Extensively In F-16XL Design, Manufacture

The F-16XL development program is the first at Fort Worth to use computer-aided design and computer-aided manufacturing methods from the beginning of an aircraft design to completion of the structure. Engineers say the methods have been so successful that CAD/CAM will be implemented in all future production design projects.

The area in which CAD/CAM was used most extensively was design of the two demonstrator aircraft's graphite-composite wings. The wing task was a challenge because of the aircraft's unique cranked-arrow planform, and because an unfamiliar material, graphite tape impregnated with bismaleimide resin, was used to build up the skins.

These factors, plus limitations on the number of personnel available to participate in the effort, created a need for extensive use of computer techniques, according to Chuck Herndon, Manager of Structural Design. At the same time, though, the program was also viewed as a "prototype" of how aircraft will be designed in the future.

"The F-16XL wing design team consisted of about 25 persons with varied levels of experience," Herndon says. "Some had been designing aircraft structures for years but had never used computers, while

younger employees had little or no practical aircraft design experience but extensive training in computer graphics use. The personnel mix worked well because the team members were able to share their knowledge. This was facilitated by CAD's data transfer capabilities."

One of the system's main advantages proved to be its capability to transfer drawings from one engineer's terminal to another and also from one department to another. Structural designers created a data base of drawings and mathematical definitions that were later used by tool designers, numerical control machining programmers and other manufacturing personnel.

"With the older, conventional system of design, the drawings would have been completely redone at each stage of the development process and also to accommodate each change that was made," Herndon says. "Successive generations of drawings have always resulted in a certain amount of imprecision in the final product. CAD/CAM eliminates this."

Design precision was especially critical in the F-16XL program because the wing skins, which are five-eighths of an inch thick at some points and were built up with as many as 160 plies of composite tape, have a sculptured inner surface that must fit on the wing box construction exactly. Otherwise, fuel leakage from the wing tanks could result.

The F-16XLs are the first U.S. Air Force aircraft ever produced with wing skins made completely of composite material.

Besides improving the accuracy of drawings, CAD/CAM saves time. Computer methods saved an estimated 6,642 man-hours in the wing design and drawing preparation task and an estimated 2,160 man-hours in subsequent master layout preparation. These estimates are based on the time the tasks would have taken using conventional design techniques, according to Sam Majors of Structural Design CAD Development.

In CAD, engineers create or modify drawings on a terminal screen by using a light pen. Once a drawing is completed, a printout or microfilm copy can be made almost instantly.

"Computer-aided manufacturing has been a major element in production of parts for the F-16, and computer-aided design is now being used in drafting new F-16 designs and modifying existing ones," Herndon says.

## Tomahawk Flies 750-Mile Mission Over Utah Range

A U.S. Air Force/Convair Ground-Launched Cruise Missile successfully completed an operational test and evaluation flight at the Utah Test and Training Range on February 23rd.

All test objectives were achieved as the Tomahawk concluded a fully guided flight of more than 750 nautical miles by flying directly over a simulated ground target on the Utah range. The missile was recovered and will be refurbished for another test flight in the GLCM program.

The flight began with launch of the Tomahawk from its transporter erector launcher, a major component of the GLCM weapon system. Shortly after launch, the missile jettisoned its solid-fuel booster and transitioned to cruise flight powered by its air-breathing turbofan engine. The missile was directed by its internal terrain-following guidance system throughout the flight.

The GLCM system is scheduled for initial deployment in western Europe beginning in late 1983. The basic GLCM combat unit consists of 16 Tomahawks loaded on four transporter erector launchers and two mobile launch control centers.

## RAM Intercepts Low, Supersonic Incoming Target

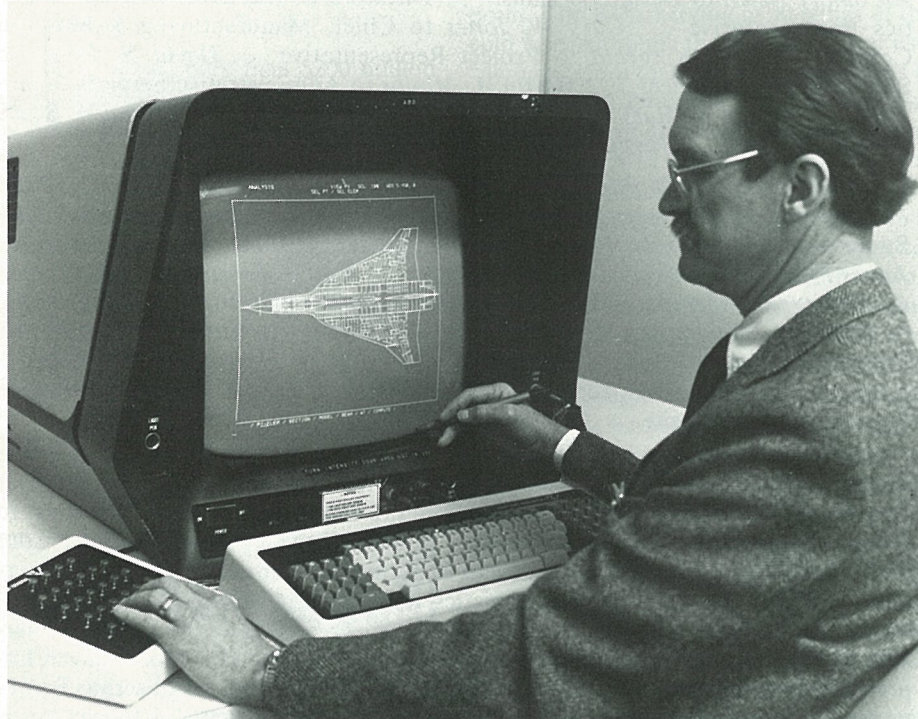
During a recent test, a Pomona RAM missile successfully intercepted the type of antiship missile it is designed to defeat.

In the test at White Sands Missile Range, N.M., the RAM intercepted a remotely controlled incoming, supersonic, low altitude Vandal missile. Vandal is a converted Talos missile.

The test represented a realistic engagement and demonstrated the effectiveness of RAM, a fast-reaction missile system designed to provide a wide range of ships with a defense against antiship missiles.

Additional tests, including launchings at sea and on land, are scheduled to continue into 1984 when a production decision is expected to be made.

RAM is in Engineering Development at Pomona under sponsorship of the U.S. Navy and the governments of the Federal Republic of Germany and Denmark. Joint development is an important step in the standardization and interoperability of North Atlantic Treaty Organization defensive systems.



**Computer-Aided Design.** Tris Pollard, Engineering Specialist at Fort Worth and lead design engineer on the F-16XL wing, calls up a view of the aircraft's structure on a computer terminal. Use of computers saved time and money in designing the F-16XL.



# GD Employees Urged to Review Benefit Statements with Family

This month, computer printers at Data Systems Division's Western Center have been preparing individualized Statements of Personal Benefits for General Dynamics salaried employees.

When the statements arrive at the employees' homes after the middle of March, they will give GD salaried employees a comprehensive picture of the value of their current benefit coverages, amounts of protection and estimates of the resources that will be available upon the employee's retirement. (Land Systems is not on the computerized system yet.)

"Very often people look at their paycheck and figure that amount is how much they are earning," says Roger L. Groh, Corporate Director, Employee Benefits. "What they don't realize is that their paycheck only reflects the direct cash portion of the compensation they have as employees of General Dynamics. Another major component of an employee's total compensation is the so-called 'fringe benefits.' The costs of these benefits are assuming a greater and greater share of total compensation — currently averaging close to one-third of pay."

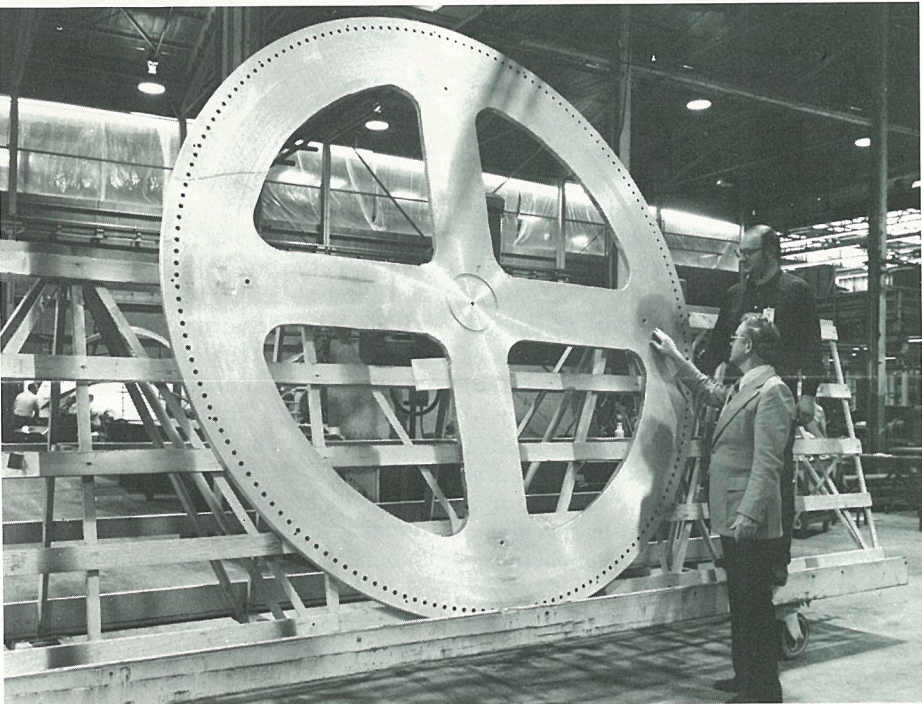
The corporation, for example, makes available health, hospitalization, disability income protection and life insurance coverage for its employees; the statement shows how much coverage is carried by the em-

ployee. In addition, the statement estimates the employee's retirement benefit based on his or her present salary, and the accumulated funds that will be available for retirement through the company's matching of employee contributions to the Savings and Stock Investment Plan and the return made on the investment of these funds.

The projected calculations on the retirement and for the SSIP fund are quite conservative as the projected retirement benefit is based on the continuation of an employee's current salary level to retirement, and the SSIP is calculated at a growth of seven percent per year as the estimated investment return.

"We are calculating on the low side," Groh says. "It may seem strange to determine growth of the fund at seven percent while investments in today's market are presently earning more than 11 percent, but since no one can guarantee what interest rates will do in the future, we wanted to be on the safe side and not give an overly optimistic picture that may not stand up over time."

"There is quite a lot of information in that little brochure," Groh says. "I strongly advise employees to sit down with their family to familiarize them with every aspect of their personal financial picture."



**Bolt Hole Locator.** Bob Bruce (foreground) and Marion Sliwinski, a boring mill machinist, examine the Shuttle/Centaur master drill plate before it was shipped from Convair to NASA's Jet Propulsion Laboratory.

## Completion of Master Drill Tool Marks Shuttle/Centaur Progress

The first tooling for Convair's Shuttle/Centaur project has been completed, marking the transition from paper studies to actual metal cutting on the project.

The master drill plate, a 750-pound aluminum casting, will be used by NASA's Jet Propulsion Laboratory to locate the bolt holes in the Galileo space probe base plate that attaches the spacecraft to the Centaur booster.

According to Bob Bruce, Manufacturing Engineer, the master drill plate is custom-designed and is nearly twice the size of similar plates used on previous Centaur-satellite matings.

The 180 holes in the plate were drilled using a radial bar that kept tolerances within two thousandths of an inch for position and within one ten thousandth of an inch for parallel. The bolt holes are

placed on a 108.6-inch diameter circle on the 10-foot-diameter tool.

After the Jet Propulsion Laboratory has completed the drilling operation for the spacecraft, the drill plate will be returned to Convair for use in locating the matching holes on the payload adapter of the Centaur.

The original aluminum casting was made by Alpanse Company in Los Angeles, which also did the initial machining. Convair's precision machining and drilling was performed in the Lindbergh Field tooling shop.

Bruce says that the master drill plate can be used for future payloads beyond the announced Galileo and International Solar Polar Mission probes, either in its present form, or if needed, with another hole pattern drilled on a smaller radius.

## Around the World... ..in GD

**CHQ:** *Pemberton Smith* transferred from Convair and was promoted to Corporate Manager, Financial Planning . . . *Barbara Plattner* was promoted to Corporate Administrator, Electronic Mail/Office Systems, Administration and Training . . . *David J. Kray* transferred from DSD and was promoted to Corporate Manager, Software and Applications Development-Electronic Mail/Office Systems . . . *Gary B. Boyd* joined as Corporate Manager, Financial Analysis.

**Fort Worth:** *D. W. Addison Jr.* was promoted to General Foreman . . . *O. L. Barnes* and *J. A. Jennings* to Senior Field Service Engineer . . . *C. D. Beaird* to Manufacturing Technology Supervisor . . . *R. G. Bradley Jr.* to Engineering Director . . . *E. O. Brooks* to Logistics Supply Representative . . . *M. G. Bush* to Engineering Chief . . . *M. B. Clampitt* to Project Coordinator . . . *C. C. Clifton Jr.* to Logistics Engineer . . . *R. M. Demby* and *N. L. Trowbridge* to Inspection Supervisor . . . *R. O. Escamilla* and *P. E. Proctor* to Logistics Supervisor . . . *R. L. Goad* to Assistant Project Engineer . . . *D. E. Harris* and *C. J. Taylor* to Industrial Engineering Specialist . . . *L. G. LaForge* to Field Service Engineer . . . *R. M. Lasalle* and *R. L. McMahon Jr.* to Manager of Manufacturing Technology . . . *C. E. Martin* to Project Engineer . . . *N. J. Mellott* to Engineering Chief . . . *V. L. Patterson* to Logistics Specialist . . . *N. H. Saunders* to Planning Specialist . . . *M. O. Skinner* and *R. S. Wiggins* to Industrial Engineering Supervisor . . . *E. S. Turner* to Material Program Administrator . . . *J. P. Unkart* to Senior Scheduler . . . *W. O. Ward* to Logistics Group Engineer . . . *A. M. Wilkendorf* to Engineer . . . *B. Willbanks* to Tool Planning Supervisor . . . *J. D. Eastes* to Chief of Industrial Relations.

**Electric Boat:** *George Andrade*, *Mark Cavanaugh*, *David Chenelle*, *Peter Endicott*, *Ricardo Fernandes*, *Chris Oksen*, *John Rondinaro*, *Roselli Simon*, *William Smart*, *Warren Tucker*, *Robert Wolf* and *Christopher Zukowski* were promoted to Foreman . . . *Timothy Connolly*, *Kevin Finn*, *John Girard* and *Paul Hieck* to Nuclear Test Supervisor . . . *John Swiatek* and *Robert Walkup* to Engineering Supervisor . . . At Quonset Point, *Frank McCann* was promoted to Training Administrator . . . *Allen Cullion* to Foreman III . . . *John Parham* to Foreman II . . . *William Smyth* to General Foreman II . . . *Ralph Richie* to Senior Process Analyst.

**Electronics:** *Dick Clavert* was promoted to Superintendent . . . *James N. Frazier*, *Reuben L. Hurst* and *James T. Williams* to Project Manager . . . *Thomas Hoy* and *Cathie Stanner* to Material Control Supervisor . . . *Walter T. Lifsey* to Supervisor . . . *Rodger C. Rawls* to Production Control Section Head . . . *Frank E. Rogers* to Material Control Supervisor . . . *Len F. Williams* to Manager of Finance . . . *Jack L. Woods* to Director of Marketing.

**DSD:** *Joseph W. Guinn* transferred from Central Center to St. Louis and was promoted to Computer Services Specialist . . . At Eastern Center, *E. Kelly Jr.* was promoted to Senior Software Engineer . . . *J. Smith* to Software Engineering Specialist . . . *P. Gardiner* to Senior Production Control Analyst . . . *J. Lawrence* to Production Control Specialist . . . At Western Center, *B. S. Keuler* to Computer Systems Analyst . . . *T. A. Schwing* to Chief, Data Administration.

**Pomona:** *Jack A. Clearwaters* was promoted to Engineering Specialist . . . *Thomas J. Cusick Jr.* to Assistant Program Director . . . *Steven G. Eggen* to Manager, Industrial Accounting . . . *Patricia A. Fall* to Material Advisor . . . *Edward V. Holzinger* to Manager, Management Systems . . . *Craig L. Johnson* and *Conrad L. Wilcoxson* to Senior Project Engineer . . . *John R. McCandlish* to Group Engineer . . . *Robert Morales* to Chief, Accounting . . . *George Rasmussen* and *Leighton H. Watling* to Chief, Production Support . . . *Walter R. Wagner* to Senior Cost Control Analyst . . . *Joseph B. Weeks* to Senior Manufacturing Engineer . . . *Thomas S. Williams Jr.* to Senior Quality Assurance Specialist . . . *Richard G. Allen* to Project Manager . . . *Lew D. Blum* and *Paul C. Cunningham Jr.* to Project Coordinator . . . *Catherine J. Brotherton* to Training Specialist . . . *Larry A. Clark* to Publications Group Supervisor . . . *Bernadette Edwards* and *Roxanne R. Rullman* to Material Liaison Representative . . . *Rudy G. Escandon*, *Kathryn A. Lober* and *John H. Wolfington* to Production Control Supervisor . . . *Wayne W. Frankenberger* to Marketing Representative . . . *Richard B. Howard* and *Alexander Netch* to Design Specialist . . . *Theodore D. Hubbard* to Senior Logistics Representative . . . *Gary W. Jones* to Chief, Manufacturing & Material Control . . . *John Kingcaid* to Project Representative . . . *David N. Miller* to Senior Quality Engineer . . . *Martin A. Mimbs* to Administrative Services Supervisor . . . *Joseph A. Russo* to Manufacturing Group Engineer . . . *Paul R. Steele* to Section Head . . . *Peggy T. Zimmerman* to Systems Analyst.

**Convair:** *Gerald D. Koch* was promoted to Material Operations Supervisor . . . *Herman R. Peters* to Superintendent . . . *Judy A. Adamson* to Accounting Supervisor . . . *James A. DeCosta* to Program Manager . . . *Mark F. Dorian* and *James F. McNeerney* to Engineering Manager . . . *Carl F. Fenstermacher* and *James G. McIntyre* to Manufacturing-Operations General Supervisor . . . *Roy T. Poston* to Manager, Engineering Support . . . *Brian K. Rohge* to Industrial Engineering-Operations Supervisor . . . *Thomas M. Sammon* to Engineering Director . . . *Larry B. Shaw* to Engineering Chief, Liaison . . . *Jack L. Wolff* to Program Director-Cruise Missile.

**Land Systems:** *Gary McGregor* was promoted to Manufacturing Expense Standards Supervisor . . . *Michael Szymanski* to Construction Project Manager . . . *Darrell Fryinger* to Inspection General Foreman . . . *Ruth Hurlock* to General Supervisor-Accounts Payable and Bookkeeping . . . *Roy Ziemann* to Configuration Manager . . . *Hiram Badia* to Experimental Fabrication General Supervisor . . . *Stennet Streebing* to Logistics Support Availability Supervisor . . . *Philip Gutzmann* to Logistics Engineering Systems Supervisor . . . *Randle Sutherland* to Records and Release Supervisor . . . *Robert Fey* to ILS Modification Implementation Supervisor . . . *Gerald McAnnally* to Logistics Engineering Supervisor . . . *Brenda Stroud* to Skill Performance Aids Supervisor . . . *Joseph Joyce*, *Vincent Lizzio* and *Willis Schenck* to Logistics Support Availability Supervisor . . . *Martin Keller* to Program Planning and Control Manager . . . *James Sherman* to Chief-Production Technology . . . *Gilbert Bowden* to Machine and Equipment Records Supervisor.

## Savings and Stock Investment Values

Salaried	Jan. 1981	Jan. 1982	Jan. 1983
Government Bonds	\$ 2.5154	\$ 2.8106	\$ 3.3840
Diversified Portfolio	2.0544	2.0370	2.6402
Fixed Income	1.1653	1.2953	1.4459
Hourly			
Government Bonds	2.5127	2.8075	3.3817
Diversified Portfolio	2.0992	2.0801	2.6948
GD Stock	\$34.3750	\$26.0000	\$38.0000



## East Valley Plant's Open House Draws 1,500 Visitors to Facility

An Open House at Pomona's East Valley facility on Sunday, February 20th, drew 1,500 employees and their families.

Employees and their guests were given a close-up look at the Stinger manufacturing area and were able to witness five demonstration firings of the Stinger Tracking Head Trainer/Launch Signature Simulator.

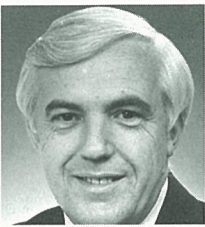
Self-guided tours of the extensively remodeled building were highlighted by displays and videotapes of the Stinger, Air-Launched Stinger, Viper and the Terminally Guided SubMissile. A film illustrating all of Pomona's products was shown continuously in a 100-person capacity conference room.

The East Valley plant, purchased by the division in 1979, includes a 283,000-square-foot building on 57.4 acres of land.

## Leonard Named Stinger Production Program Director

William M. Leonard has been appointed Production Program Director, Stinger Weapon Systems, at Pomona.

In his new position, Leonard will be responsible for the cost, schedule and technical direction of Stinger production programs. He had been Director of Division Productivity.



Leonard

Stinger, a successor to the Army's Redeye, is a shoulder-fired, ground-to-air missile system designed to provide air defense coverage for the U.S. Army and Marine Corps.

Leonard joined Pomona in 1973 and has held a variety of positions, including Manufacturing Development Specialist, Chief of Manufacturing Development, Manager of Manufacturing Development, Director of Manufacturing Engineering and Director of Advanced Manufacturing Engineering.

## Convair Seeks Small, Minority Local Suppliers

Convair has launched a program to broaden its base of local suppliers and contractors, especially among minority-owned or small businesses.

In a brochure mailed in early March to more than 2,300 potential suppliers, the company listed examples of the parts and services which it buys and included a reply card for the potential suppliers to indicate capabilities.

Convair buys more than \$200 million worth of parts and services each year from suppliers throughout the country. Last year, more than \$73 million was spent in the San Diego area with \$49 million of the contracts going to small and minority-owned businesses.

According to C. W. Patmon, Small Business Administrator, who is leading the campaign for Convair, the division is interested in making Southern California small businesses aware of the type of products it buys and hopes, through the program, to qualify 100 or more additional sources.

# GD World

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G. Alexander Smith

It represents a major capital investment and is a key area of expansion for the division.

The facility's primary purpose is the development and production of electro-optical products. They include portions of the guidance systems for Stinger, TGSM and the RAM missile.

The building also contains the division's publication group and field offices for U.S. Army representatives.

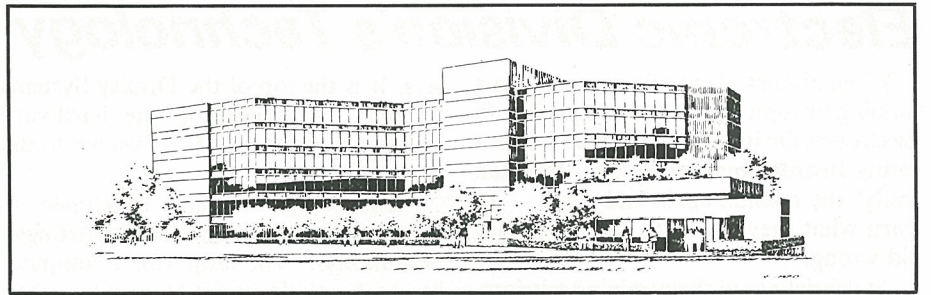
The major product at East Valley is the Stinger weapon system. The shoulder-launched version of Stinger is currently being produced, with future versions to include Stinger-POST (Passive Optical Seeker Technique) and Air-Launched Stinger.

The 1,100-employee population at East Valley is expected to increase to 1,200 or more before 1984.

## Mandell Honored As Pomona's Best Suggester in 1982

Senior Quality Assurance Representative Manuel Mandell received Pomona's Suggester of the Year Award for 1982. He had submitted nine suggestions in 1982; the three which have been adopted represent a total savings of \$73,157 during the first year. Five of his suggestions are still pending disposition.

In recognition of his contribution, Mandell received a \$250 check and a plaque from Chuck Seeger, Quality Assurance Director.



An Artist's Concept of EB's New Engineering Building

## Work to Begin Soon at Electric Boat On \$20 Million Engineering Building

Electric Boat will break ground for a new engineering building late this summer.

The \$20 million project was approved on March 4th by the General Dynamics Board of Directors, and Electric Boat will proceed to obtain the necessary building permits as soon as possible.

The six-story structure will be built on company property just south of the shipyard's South Yard Gate, with occupancy scheduled in the late fall of 1984.

Featuring an energy-efficient reflective

insulated glass and metal panel exterior with outside elevators, the building will house 1,600 people.

Before the ground breaking, Electric Boat will demolish an older building on the construction site and relocate the operations now there to four new smaller buildings. That work will start this month.

The company said it expects to award the construction contract soon for the new building. Daniels Construction Co. of Greenville, S.C., is the designer.

## EB Men Design Spot Welding System To Improve Submarine Deck Stripping

Three Electric Boat employees have designed a new welding procedure at the yard which makes submarine construction faster and easier.

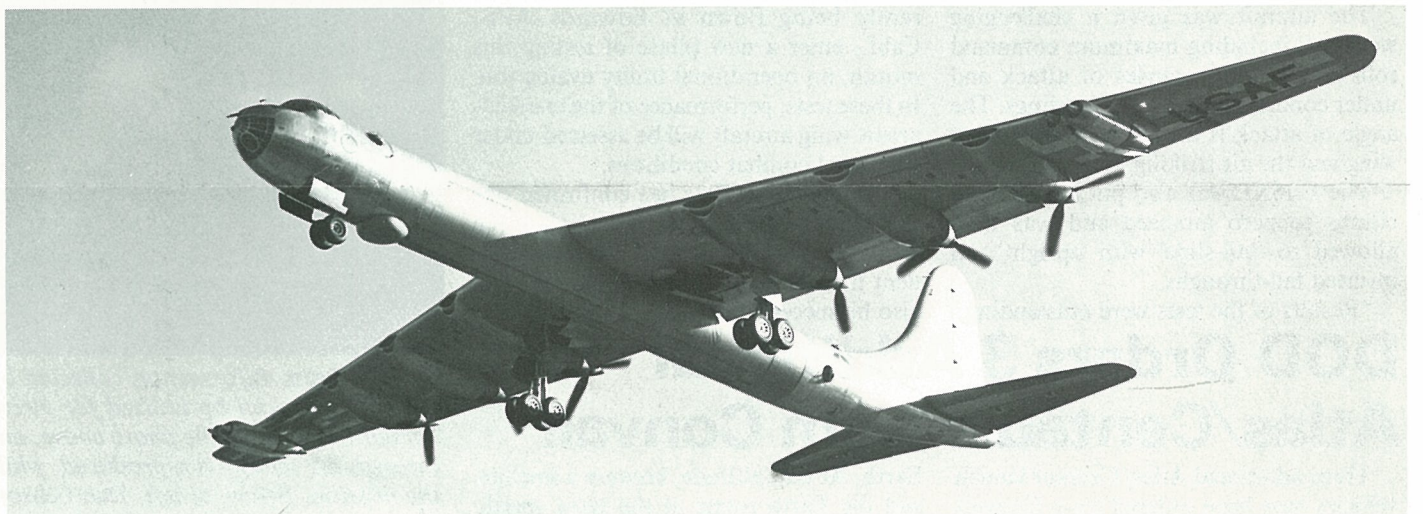
The trio is from the Tools and Equipment Department and includes: Foreman Bill Berger; Bob Gordon, a Weld Machine Repair Electronics Technician, and Dennis Urrea, a Supervisor in the Equipment Control Center.

The three men designed a tungsten inert gas spot welding system that saves ap-

proximately 10,000 man-hours per Trident missile sub and 1,000 man-hours on each fast-attack submarine.

The system saves the time by replacing the conventional plug welding of deck stripping.

Before Berger, Gordon and Urrea devised their system, the welding had to be done off the boats, because the operation used high frequency for arc initiation which was not compatible with certain electronic components aboard the ships.



A B-36D Peacemaker

## Convair's B-36 a Successful Weapon for Peace

August 8, 1946, was a big day for the Consolidated Vultee Aircraft Co., a forerunner of General Dynamics. By 9:30 a.m., hundreds of cars stood bumper-to-bumper along streets and roads bordering Carswell AFB at Fort Worth, Tex. Thousands of Convair employees also had left plant buildings west of the airfield and massed along the fence to see the first flight of a new airplane. After a lengthy cockpit check, Test Pilots B. A. Erickson and 'Gus' Green revved up the plane's six piston engines and released the brakes. The 100-ton giant accelerated down the runway on wheels nearly 10 feet high and lifted smoothly, borne on a broad, swept wing having double the span of Consolidated's famous B-24. The crowd roared as the XB-36, the world's largest and heaviest bomber, climbed into the sky.

Over the next eight years, 384 more B-36s rolled down the same runway to give the U.S. Air Force a powerful fleet of intercontinental bombers capable of flying 10,000 miles without refueling and dropping a 10,000-pound bomb load at the halfway point. The B-36, serving in 10 wings of the Strategic Air Command, was the nation's prime nuclear weapon carrier in a decade of cold war. Although the B-36 was never used in combat, Gen. Nathan F. Twining, Air Force Chief of Staff, said in 1955 that the B-36 "perhaps more than any other factor has kept us from being attacked." Appropriately, the B-36 was named the "Peacemaker."

Everything about the B-36 and its performance was awesome. Flying more than 435 miles an hour, it could carry a heavier bomb load for greater distances than any other aircraft in the world. One B-36B, with a fuel capacity of 30,000 gallons, dropped a total of 84,000 pounds of dummy bombs, the heaviest bomb load ever carried by one airplane. The maximum gross weight of the giant airplane was 410,000 pounds. Its maximum service ceiling was 42,500 feet. Its wingspan was 230 feet; its length was 162 feet, and its rudder was nearly 47 feet high. The B-36 had a crew of 16, including five relief men, and carried more defensive firepower than any other aircraft, with eight remote turrets containing a total of 16 20-mm. cannons.

The concept of the B-36 dated back to nine months before the attack on Pearl Harbor. On April 11, 1941, the Army Air Corps invited Consolidated and Boeing to submit preliminary design studies for a bomber of intercontinental range. On May 3, 1941, Consolidated submitted a preliminary proposal for a high-wing twin-tail, pressurized plane with six engines and pusher-type propellers. In October, the Army Air Forces decided to award a contract to Consolidated for two experimental bombers with a redesigned single tail. The contract was signed Nov. 15, 1941, and construction of a mockup started at San Diego. By 1942, however, the West Coast plant was employing all its capacity for wartime bomber and seaplane production and the XB-36 project was transferred in August to the new Fort Worth plant. An initial contract for 100 B-36s was awarded Aug. 7, 1943, and before World War II ended, the Army Air Forces picked the B-36 as the plane around which the postwar air arm would be built.

Production B-36As started coming off the line in August 1947, delivered as familiarization trainers. The first service delivery was made the following June to the Seventh Bomb Wing at Carswell. On Dec. 7-8th, a Carswell B-36A established its range with a simulated attack mission to Hawaii, flying 9,600 miles nonstop and dropping a 10,000-pound load en route home.

The last Peacemaker, a B-36J, was delivered from Convair-Fort Worth on Aug. 14, 1954. By then only the basic airframe resembled the prototype. Since 1946, performance had improved steadily, and the bomber had added more than 100,000 pounds in gross weight, more than 100 mph in speed and more than 10,000 feet in service ceiling. Later models of the B-36, starting with the B-36D, were equipped with four General Electric J-47 jet engines slung in twin pods under the wings in addition to the six Pratt & Whitney R-4360 Wasp Major piston engines in nacelles aft in the wings. Another 71 B-36Bs were given the jet power and modified to B-36D standards at the San Diego plant. Their 10 engines developed as much horsepower as nine locomotives.

The Boeing B-52 jet bomber began replacing the B-36 in the mid-1950s, and the last B-36 was retired by the U.S. Air Force on Feb. 12, 1959. Almost 13 years after the XB-36 took to the air, the era of the piston-powered bomber in the U.S. was over, but the Peacemaker had done its job well.



## Electronic Division's Technology Transforms Computer Data

When aircrews land after completing a training mission on a range equipped with Electronics Division's Air Combat Maneuvering Instrumentation System, they can "refly" the mission again and again — to learn what they did right and what they did wrong.

At debriefings of their training missions, pilots can view the entire mission displayed on a 6-foot-square screen, or they can have a three-dimensional view of their dogfight maneuvers as if they were sitting in a helicopter two-and-a-half or five miles from the combat. Or they can see the dogfight as viewed from their cockpits with the aircraft's instruments and a representation of the ground and the opposing aircraft shown on the screen.

"If a young pilot makes a mistake, his instructor can split the mistake up into brief segments and show him from his cockpit or from some distance away exactly what he did wrong," says P. O. Wilson, Display Systems Section Head at Electronics. "The displays we have developed in our laboratory allow us to provide the instructors and the students with a variety of reenactments of the mission."

The division's range systems track the aircraft participating in a training exercise and record their movements and maneu-

vers. It is the job of the Display Systems Laboratory to develop the hardware which allows the data to be shown to the aircrews later.

"Right now, we have developed 18 views of the action for pilot debriefings," Wilson says. "The output of a computer has to be made useful to people; otherwise, it has no value. The normal way to display the output of a computer is with figures and letters or diagrams on paper, but these methods are pretty slow — our displays give rapid access to data and images immediately in full color typically in less than a second, rather than in minutes and hours."

The Display Systems Laboratory at Electronics has two principal missions: developing advanced display technology and applying the technology to the division's product lines. It also performs research on the most effective image size, color and shapes.

In the laboratory itself, two six-foot-square screens dominate one wall, faced by two consoles with cathode ray tube screens the size of a 19-inch television set.

Computer data can be displayed on the large screens projected by a three-gun display projector, working in much the same way as large-screen television sets that are

now being sold commercially.

Unlike those commercial systems, which often blur near the edge of the screen, however, Electronics' display projectors use high-brightness, high-resolution cathode ray tubes coupled with optical systems capable of 3,000-line resolution, and the screens have even brightness edge to edge.

There is another critical difference between Electronics' display and commercial large television screens. Conventional televisions operate on the "raster scan" where the picture is in a series of repeated lines. There are 525 of these lines in the normal U.S. television picture.

Electronics uses the calligraphic, or "stroke" method, in which the beam is directed to a precise point on the screens and the computer draws the image. In the Electronics system, the display generator is capable of locating more than 4,000 points either in the horizontal or vertical axis. In addition, the picture can be rotated in any direction, providing a great variation of views.

The operator console and the display

generator, or gun, are the products of the Display Systems Laboratory and have had applications in a number of the division's products.

"Using this system, we can show potential customers of our range systems how they work from our office, without having them make an inspection trip which would cover hundreds of square miles in inaccessible desert," says Wilson. "Or we can show customers our Automatic Test Equipment information that would be on the test operator's screen without having them crowd around a small screen on the AIS."

And E. R. Gauthier, Display Systems Marketing Manager, says, "Our display systems have a wide variety of applications for both military and civilian customers. They are used in military Command and Control centers, for management information systems, for computer-aided design, for engineering or instruction. These systems that we have developed can be used anywhere that large amounts of computer-generated information need to be shown to groups of people immediately."

## F-16XL Testing Proves Aircraft Ready for Operational Evaluations

U.S. Air Force and company pilots have completed high angle-of-attack testing on the first F-16XL demonstrator, marking another important milestone in the evaluation of the derivative of the operationally proven F-16 attack-fighter.

The aircraft was given a challenging workout, including maximum command rolls at maximum angles of attack and under conditions of high 'g' loadings. The angle of attack is the angle of an aircraft wing and the air striking it.

The F-16XL was also put into vertical climbs to zero airspeed and was then allowed to 'tail-slide' with upright and inverted fall-throughs.

"Results of the tests were outstanding,"

said Randy Kent, Vice President for Fort Worth's F-16XL Program. "The airplane experienced no spins or deep stalls and self-recovered flight attitudes with no pilot inputs required."

The two F-16XL models that are currently being flown at Edwards AFB, Calif., enter a new phase of testing this month, an operational utility evaluation. In these tests, performance of the cranked-arrow wing aircraft will be assessed under simulated combat conditions.

"All testing to date has confirmed our predictions of the great potential of the airplane," said Kent, "and we feel confident that the operational evaluations will also be successful."

## DOD Orders 3 Additional Atlas/Centaurs from Convair

Three additional Atlas/Centaur launch vehicles have been ordered from Convair to launch Fleet Satellite Communications satellites for the Department of Defense.

According to Robert Benzwi, Convair Mission Manager, the satellites are scheduled for launch in 1985, 1986 and 1987. The first satellite will be similar to the five previously orbited between 1978 and 1981, while the other two will be more advanced versions.

The FLTSATCOM satellites are part of a worldwide U.S. Navy, Air Force and DOD system that provides communications among naval aircraft, surface ships, submarines, ground stations, elements of the Air Force's Strategic Air Command and the Presidential command network.

The satellites are placed in geostationary orbit about 22,200 miles above the

Earth. At that altitude, because a satellite and the Earth rotate at the same speed, the satellite remains in position over one spot on the Earth's surface. From its orbital location, FLTSATCOM provides two-way communications over 23 superhigh frequency channels.

Convair-built Atlas/Centaurs have been NASA's primary launch vehicles for putting communications satellites in orbit, as well as launching planetary exploration missions. In addition to the five previous FLTSATCOM satellites, Atlas/Centaur has boosted 19 Intelsat communications satellites and three domestic Comstar satellites.

Since the first Atlas/Centaur was launched in 1962, there have been 60 Atlas/Centaur missions.

## Minneapolis-Saint Paul Launched During Ceremony at Electric Boat

Gray skies and a thickening fog didn't deter six thousand spectators and guests from attending the launching of the Navy's latest Los Angeles-class fast-attack submarine at Electric Boat on March 19th.

*Minneapolis-Saint Paul* (SSN 708), the first naval vessel to bear the joint name of Minnesota's twin cities, slid into the mist-shrouded Thames River after Mrs. David Durenberger, wife of Minnesota's senior Senator, smashed a bottle of champagne on the bow of the 360-foot, 6,900-ton vessel.

Sen. Durenberger, who delivered the principal address, told those on hand at the noon ceremonies that the nation "must make it clear to any potential adversary that our antisubmarine defenses are sufficient to counter any possible threat."

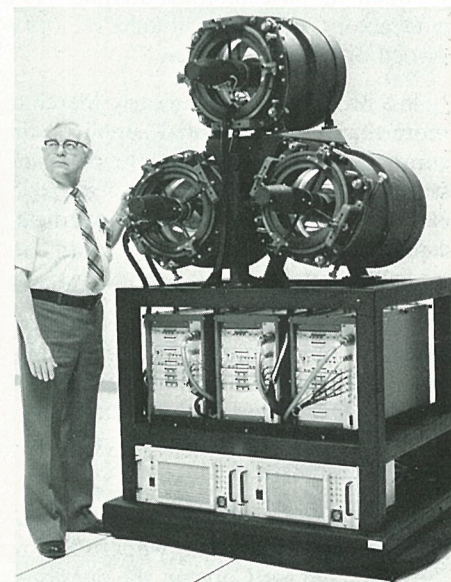
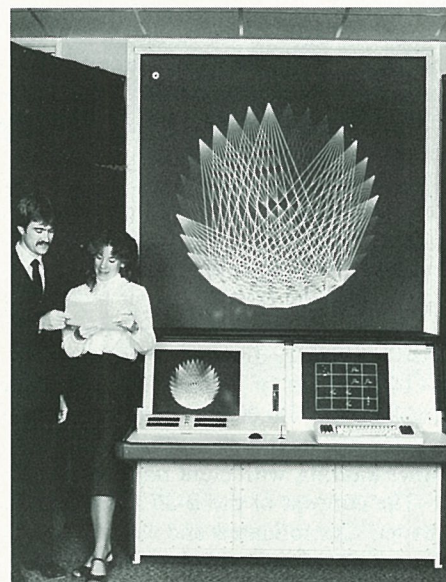
"Every submarine we put to sea — and we have only one-third the number of those in the Russian fleet — helps to ensure that goal," Durenberger said. "A strong submarine force means a strong Navy and a strong Navy means a secure America."

"Minnesota is 1,200 miles from the Atlantic Ocean," he continued, "and even further than that from the Pacific. Yet every American understands how our oceans help our health in peacetime and security in wartime."

Dr. A. Duncan MacDougall of Groton, Conn., who retired last summer after 32 years as the shipyard's Medical Director, returned to be the "Triggerman" for the launching. Dr. MacDougall shoved forward the rigger that released the ship.



**Usable Data.** Information collected by an Air Combat Maneuvering Instrumentation system can be utilized for aircrew debriefings through Electronics' Large Screen Displays. In the photo above, on the large screen at left, the view a pilot sees through his canopy is reproduced, while the screen on the right shows a profile of the mission. Below, at left, Dan Gibson, Electronics Engineer, and Chris Kerbow, Systems Analyst, review data beside a Large Screen Display showing a rosette pattern which is made up of 256 vectors. Below at right, P. O. Wilson, Display Systems Section Head, checks a full audience display projector used for the Large Screen Displays. Each of the three projector guns is used to show one primary color on the screen.



## GD-Sponsored College Scholarships Awarded to Daughters of Employees

Three daughters of company employees have been awarded General Dynamics National Achievement Scholarships. The scholarships can range up to \$3,000 per year and are renewable for four years of undergraduate study or until a baccalaureate degree is completed, whichever comes first.

The three are: Kimberly E. Alexander, daughter of Willie E. Alexander and Eunice M. Alexander, a Financial Analysis Assistant at Fort Worth; Kathy R.

Kelly, daughter of John W. Kelly, an Electrical Engineer at Land Systems, and Lula M. Kelly, and Cecelia Scott, daughter of Anderson L. E. Scott, a Welding Supervisor at Electric Boat, and Sarah M. Scott, a Data Entry Supervisor at Electric Boat.

General Dynamics sponsors National Achievement Scholarships each year for outstanding black students. The scholarships are awarded by the National Merit Scholarship Corporation.



## NASA Studies Shuttle/Centaur For New Flights

Convair's wide-body Centaur high-energy upper stage, already selected for four missions to be launched from the Space Shuttle, is being considered for two more missions in the late 1980s.

NASA is planning a new mission requirement for Centaur with the Venus Radar Mapper spacecraft, and the Air Force is planning a third space mission for its Shuttle/Centaur version. These new missions were announced recently by Harry Clark, NASA Centaur Program Manager in Washington, DC.

For use with the Shuttle, Centaur will be made in two versions, a 20-foot long model called "Centaur-G" to be used by the Air Force, and a 29.6-foot long "Centaur-G-Prime", which will be used initially by NASA.

Production of subsystem hardware for the first four Centaurs has begun at Convair. A mating tool, used for drilling the holes that will join the Centaur to the payload, has been completed and shipped to the Jet Propulsion Laboratory. Work has begun on detail parts and tooling for the test tank, and some avionics have been started in breadboard form. A mockup of the Centaur in the Shuttle cargo bay is taking shape and will be used for fit checks of subsystems, such as valves, tubing, electronic packages and their interconnecting harnesses.

According to Russ Thomas, Shuttle/Centaur Program Manager at Convair, the Centaur-G-Prime test vehicle will be completed in the spring of 1984 and will then begin structural testing at the Sycamore Canyon Test Site. It will undergo cryogenic and load testing to verify its structural integrity for flight. A Centaur-G test vehicle will also be built and tested.

The first two missions for Centaur in the Shuttle are scheduled for launch in May 1986: the Galileo Jupiter probe, and the International Solar Polar Mission. These two missions will be launched using two different Space Shuttles within a 21-day period. Two Shuttle launch pads are to be available to accommodate the two missions.

## Material Service Acquires Firm In El Paso, Tex.

Material Service Corporation recently acquired El Paso Sand Products, Incorporated of El Paso, Tex. Credited as being the largest producer of building materials in West Texas, the company annually produces between 1.5 and 2 million tons of sand and stone and employs more than 300 people.

Negotiations between Material Service and El Paso Sand Products' previous owner, James Shelton, began in the early months of 1982. The purchase was finalized in March of this year, adding to Material Service the following: a large quarry, a sand plant, nine Redi-Mix concrete plants with 100 Redi-Mix trucks and a construction company.

Victor Moore remains President of El Paso Sand Products, and Donald McCoy will continue in his role as President of El Paso Rock, El Paso Sand Products' subsidiary.

Richard Levy, former Assistant to the Vice President of Operations at Material Service, has been promoted to Financial Vice President of El Paso and is the primary liaison between Material Service, General Dynamics and El Paso Sand Products. Donald Buescher, formerly General Dynamics Corporate Manager of General Accounting, serves as the El Paso company's Comptroller.

No other personnel changes are contemplated.

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## Convair Selected to Develop USAF Advanced Cruise Missile

(The following is the text of an Air Force press release issued April 15, 1983.)

The U.S. Air Force today announced that it will initiate action to procure no more than 240 of the current generation Air Launched Cruise Missile (ALCM-B) in Fiscal Year 1984. This action will ensure an orderly transition from the ALCM-B to the Advanced Cruise Missile (ACM), a program that is progressing smoothly.

In August 1982, the President approved development and deployment of an ACM, and the Air Force issued a request for industry proposals in September. Boeing Aerospace Company, Seattle, Washington; Lockheed Missiles and Space Company, Sunnyvale, California; and General Dynamics, Convair Division, San Diego, California, have been in competition for a source selection decision since that time.

The Air Force today also announced selection of General Dynamics to develop the ACM. A fixed price incentive firm contract will provide for ACM full-scale development, and includes "not to exceed" cost options for the first two production lots. Due to the classified nature of the program, the contract value, production quantities, and program schedule are not releasable.

In July 1982, the Air Force concluded an assessment of the requirements for a next generation cruise missile. This strategic cruise missile "roadmap" reviewed emerging technologies in light of threat projections through the 1990s. The study determined that it would be feasible to develop an ACM which capitalized on significant advancements in cruise missile technology, while providing a logical and timely upgrade to the ALCM force.

The ACM will join the current generation ALCM-B in a mix of about 3,000 strategic ALCMs deployed on B-52 and B-1 aircraft. The ACM will have improved range, accuracy, survivability, and targeting flexibility.

## Two Sub-Launched Tomahawks Fly Land Attack Test Missions

Within three days, two Convair-built Tomahawk cruise missiles were launched off the coast of California from the submerged USS *LaJolla* and flew successful land attack missions hundreds of miles inland.

The first test flight was conducted April 14th. The missile made landfall north of Santa Barbara, Calif., and flew more than 400 miles to the target area in the Nevada desert guided by its terrain matching guidance system. Once in the target area, the missile was directed to its target by its digital scene matching terminal guidance system.

The second test followed on April 16th, and the missile flew more than 800 miles to the target area on the Utah Test and Training Range. After passing over the target, the missile was recovered by parachute.

The tests were the 99th and 100th flights

of the Tomahawk, which is being produced for the U.S. Navy and the Air Force by Convair. The Department of Defense's Joint Cruise Missile Project directs development, testing and production of all Tomahawk variants.

The USS *LaJolla* was built by Electric Boat and was launched August 11, 1979.

### Dividend Increase

The General Dynamics Board of Directors on April 7th declared a regular quarterly dividend of 25 cents per share on the company's common stock and \$1.0625 on its Series A preferred stock, payable on May 16, 1983 to shareholders of record on April 18, 1983.

The 25 cents per share dividend on the common stock compares with the quarterly dividend of 18 cents per share which has been paid for each of the past 10 quarters.



**On Its Way.** A Tomahawk cruise missile broaches the surface of the Pacific Ocean on a test flight after being launched from a submerged submarine.

## F-16XLs Exceed Flight Schedule

The two F-16XL demonstrators now being flight tested at Edwards AFB, Calif., and Nellis AFB, Nev., are continuing to show outstanding capabilities, said Randy Kent, Vice President for Fort Worth's F-16XL Program.

As of April 15th, the single-seat F-16XL, a derivative of the operationally-proven F-16 Falcon, had made 176 flights since its initial flight July 3rd, 1982. The dual-seat F-16XL, which had a first flight October 30th, at the same time had recorded 138 flights.

That made a total of 314 flights, far exceeding the original schedule that called for 240 flights by the middle of May.

Kent attributed the increased flights to the designed-in maintainability and reliability which has been demonstrated by the Falcons that are operational now in eight nations.

During March, 81 F-16XL flights were recorded on 22 flying days. Eleven of those flights were made on two days and three flights per day for each aircraft is not unusual.

Operational Utility Evaluation testing on the air combat range at Nellis is continuing.

In these tests the F-16XL is subjected to simulated combat situations in both the air-to-air and air-to-ground configurations.

## Thunderbird F-16s Begin Show Schedule

More than 200,000 spectators gathered at Nellis AFB, Nev., on April 2nd to witness the first public performance of the U.S. Air Force Thunderbirds in their Fort Worth-built F-16s.

The precision flying team thrilled the crowd with straight-up climbs, 360-degree turns, eight-point rolls and a variety of tight formations that aptly demonstrated the maneuverability and power of the Falcon.

Besides being the Thunderbirds' first public outing flying their Falcons, the show was the team's first public demonstration since 1981 and the first open house featuring them at their home base since 1980.

The crowd was the Thunderbirds' largest ever at Nellis.

A few hours before the show began, USAF Maj. Schumpert "Hoss" Jones, the team's lead soloist, made some comments about the F-16: "This aircraft is just so much fun to fly. The fly-by-wire system is amazing, and visibility is outstanding."

"The loops we do during the show use about 83 percent of the engine's maximum thrust, while maximum power is used during the solo vertical climbs," he added. "Speed must be kept below the sound barrier and ranges from about 170 mph, at the slowest, to a high of 650 mph. The aircraft's altitude in show maneuvers ranges from 200 feet to 15,000 feet, the peak of the solo climb."

The clearance between wing tips of opposing aircraft is only three to five feet in some Thunderbird formations, such as the famous Diamond.

At the start of the show, the six Thunderbird aircraft taxied to the far end of the runway as the "Superman" movie theme was being played over a sound system and a narrator briefly described F-16 design features such as the aircraft's high "g" capability.

On signal, the sound switched to the cockpit of the Team Leader, Maj. James D. Latham, who said "Let's run 'em up." As the aircraft took off, only the roar of the engines was audible.

The half-hour show included more than 30 maneuvers and formations. Among the crowd's favorites were a Spiral Solo Climb; the Calypso Pass, in which two aircraft fly by with one inverted; the Five Card Loop, and the Crossover Break, in which two aircraft fly toward the crowd from

*Continued on Page 4*



# R. H. Widmer Honored by AIAA With Reed Aeronautics Award

Robert H. Widmer, retired General Dynamics Vice President-Science and Engineering, has been selected to receive the Reed Aeronautics Award of the American Institute of Aeronautics and Astronautics at the organization's annual meeting in Los Angeles, Calif. in May.



Widmer

Widmer was selected "for exceptional service and contribution to aeronautics and his nation over 40 years as design innovator, technical leader and inspiring engineering executive, during which he led the development of four of the USAF's advanced aircraft — the B-36, B-58, F-111 and F-16 — and pioneered the areas of supersonic cruise and fly-by-wire computerized flight control."

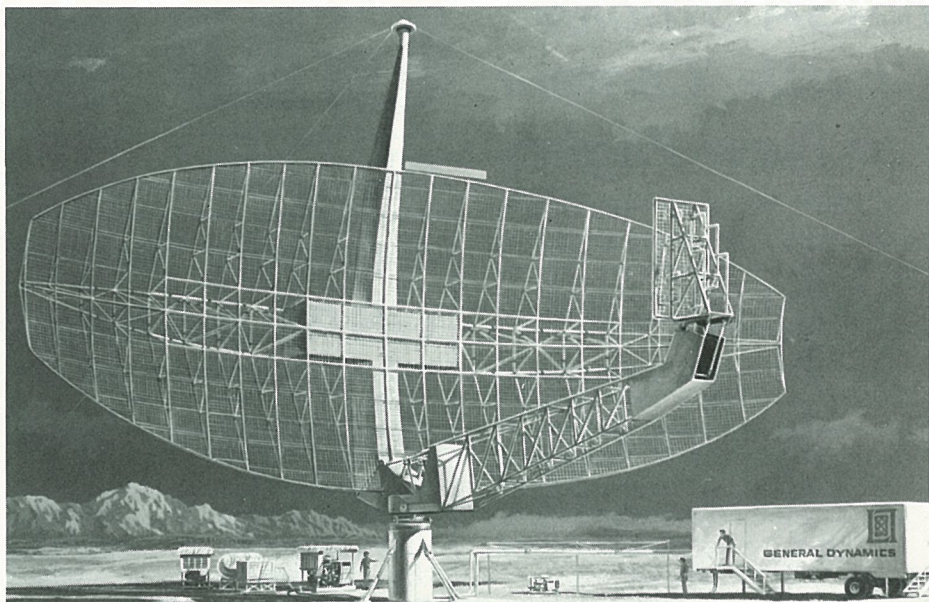
The Reed Aeronautics Award is the highest award the AIAA can bestow and is awarded annually for the most notable achievement in the field of aeronautical science and engineering. It is named in memory of Dr. S. A. Reed, aeronautical engineer, designer and founding member of the former Institute of Aeronautical Sciences.

A 42-year veteran of General Dynamics, Widmer joined the company in 1939 as a detail draftsman in San Diego. In

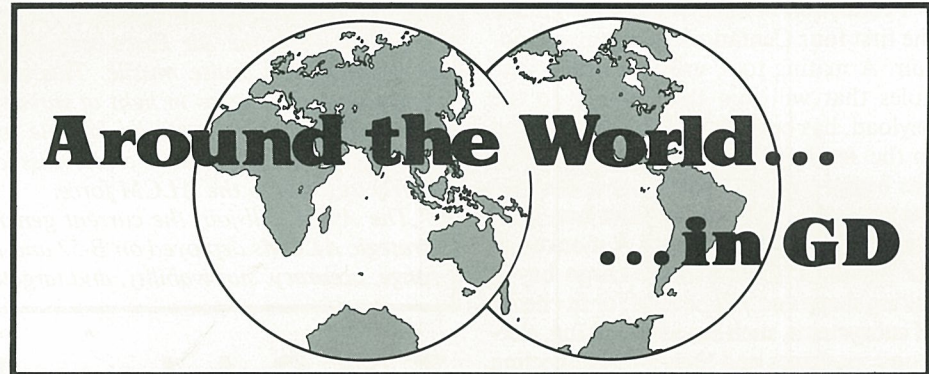
1942, he transferred to the Fort Worth plant and became head of the aerodynamics group. He assumed increasingly responsible management positions at Fort Worth, becoming Chief Engineer in 1959 and Vice President of Research and Engineering in 1961, a position that was later expanded to include Convair. He was named Corporate Vice President-Science and Engineering in 1974 and retired from General Dynamics in May 1981.

He has received numerous awards, including the Field of Science Award from the Air Force Association, the Spirit of St. Louis Medal from the American Society of Mechanical Engineers and, in 1969, the Engineer of the Year award from the Texas Society of Professional Engineers. In 1967, he received an honorary Doctor of Science degree from Texas Christian University. He is a Fellow of the American Institute of Aeronautics and Astronautics and was elected to the National Academy of Engineering in 1977.

Widmer is a consultant to the National Science Foundation's Science and Technology Office. He has also served as a consultant to the Assistant Secretary of Defense for Research and Engineering and as a committee member of the Air Force Scientific Advisory Board, the Aeronautical Systems Division Advisory Group and several committees of the National Aeronautics and Space Administration.



**For Research.** Fort Worth's Electronics Products Department has been awarded an \$8 million contract to develop and build a very high frequency instrumentation radar (shown in artist's concept above) for the Massachusetts Institute of Technology's Lincoln Laboratory. The transportable radar will be used at various locations in the United States for radar signature research. The antenna system will be approximately 120 feet long, about 85 feet high and weigh approximately 20 tons.



## F-16 Quality Assurance

# Sampling Systems Combined To Verify Exact Part Tolerances

Fort Worth Quality Assurance engineers have improved the automatic inspection of machined F-16 components by developing computer software that increases the "artificial intelligence" of the machines used to measure the parts.

The software combines two sampling plans into a single plan called the Computerized Lot Analysis Sampling System. While the CLASS software is new, the three machines, which verify the tolerances of components machined by computer numerical control processes, have been used for more than four years.

"The methods incorporated in the CLASS are characteristic sampling, the examination of selected critical features, and lot sampling, the examination of individual components as representative of all the components in a group," said Cliff Corbett, Lead Quality Assurance Engineer for the development of the software.

From data compiled in past inspections, the machines now "know" that certain characteristics can occasionally be out of tolerance and must be inspected on each component produced. Likewise, the machines are aware that other characteristics require inspection only at programmed intervals, such as every twentieth item, due to the consistency of CNC machining.

Corbett said the intelligence capability allows quicker, reliable inspection of 180 different bulkheads, spars and other CNC machined airframe components.

The sensing device of each machine is mounted on an arm that hangs from a 2,000-pound movable bridge. The bridge is capable of traveling up and down the length of the inspection table — parts up to 140 inches long, 42 inches wide and 35 inches tall can be measured. The inspection table consists of a 16-ton block of granite that is flat to within one-thousandth of an inch.



**Close Encounters.** A vector movement coordinate measuring machine probe nears the edge of an F-16 outboard beam as it prepares to automatically measure the component which rests on a 16-ton block of granite.

Savings and Stock Investment Values				
Salaried	Feb. 1981	Feb. 1982	Feb. 1983	
Government Bonds	\$ 2.5356	\$ 2.8369	\$ 3.4452	
Diversified Portfolio	2.0783	1.9593	2.7977	
Fixed Income	1.1746	1.3063	1.4584	
Hourly				
Government Bonds	2.5329	2.8335	3.4427	
Diversified Portfolio	2.1237	2.0002	2.8558	
GD Stock	\$33.7500	\$23.0000	\$41.8750	

**CHQ:** Dennis L. Arens joined as Corporate Office Telecommunications Manager . . . Yvonne S. Attard as Auditor . . . James P. Farber as Corporate Director, International Planning - Washington . . . Molly V. Roether as Auditor . . . Michael F. Tobin as Tax Accountant.

**Fort Worth:** I. H. Aguirre and J. C. Hartman were promoted to Assistant Project Engineer . . . J. B. Brown Jr., A. F. Smart and J. W. Stanbery to Senior Logistics Engineer . . . F. K. Clark Jr. to Engineering Program Manager . . . G. M. Croy to Chief, Manufacturing Technology . . . D. R. Davis, L. Dodd Jr. and R. W. Ealey to Logistics Engineer . . . J. M. Dunigan and W. A. Hehs to Engineering Chief . . . G. L. Foster and L. B. Smith to Project Manager . . . R. L. Gallo and M. S. Williams to Supervisor, Manufacturing Technology . . . J. A. Hammond to Senior Quality Assurance Engineer . . . A. R. Harris to Senior Financial Analyst . . . R. E. Hassel and E. F. Renner to Project Engineer.

**GDSC:** J. J. Staud was promoted to Program Manager - Venezuela, F-16 Interim Contractor Support . . . J. E. Brown to Group Leader, Logistics.

**Pomona:** William J. Greif was promoted to Project Engineer . . . Richard D. Miner, Donald R. Pillasch and Robert E. Marsh to Project Administrator . . . Marshall K. Andrews to Manufacturing Supervisor . . . Robert A. Bradley to Project Coordinator . . . Dale L. Fagg and Arthur L. Murray Jr. to Staff Engineer . . . Francis M. Gault to Supervisor, Production Control . . . William E. Goggins to Chief, Manufacturing & Material Control . . . William B. Pedace to Manager, Development/Training . . . Bernie Roach to Guard Chief.

**Convair:** Peter Homa, Richard W. Roberts and Ronald G. Baird to Tooling Supervisor . . . James G. Petrie to Chief, Manufacturing Engineering . . . Frank E. Rockenback to Manager, Manufacturing Control . . . Paul E. Allen to Supervisor, Quality Assurance . . . Larry W. Ayers to Group Supervisor . . . Stephen C. Birmingham to General Supervisor, Material Operations . . . Charlene M. Chadwell and Mark Normand to Supervisor, Material Operations . . . Thomas I. Johnson to Chief, Production Support - FS . . . Bruce H. Marshall to Industrial Relations Administrator . . . James P. McAllister to Configuration Management Supervisor.

**Datagraphix:** Ray E. Davis and Larry M. Kress to District Sales Manager . . . Lin W. Fox to P/S Financial Control Manager . . . James W. Marsh to Supervisor, Communications & Office Services . . . Masa Mayekawa to Supervisor, Maintenance & Calibration . . . Grett M. Wileman to Manager, Financial Planning . . . Donald T. Buczynski to Project Engineer . . . Roger A. Weber to Special Courses Instructor.

**Electric Boat:** Gerald Gilstad was promoted to Engineering Project Manager . . . Daniel McCarthy to Engineering Supervisor . . . Benjamin Bolt to General Foreman . . . Louis Nassetta to Foreman . . . Audrey Parrish to Personnel Supervisor . . . Donald Terry to Technical Writing Supervisor . . . At Quonset Point, Louis Annino was promoted to Foreman II . . . Richard Morel to Planning Material Supervisor . . . John Meola to Safety Administrator . . . At Avenel, John Reilly was promoted to Business Planning Administrator.

**Electronics:** Don Butterfield and Susan Rile were promoted to Manager, General Procurement . . . Paul Hansford and Tim Murphy to Purchasing Agent . . . Joyce Russell to Senior Word Processing Center Coordinator . . . Darinka Tretinjak to Supervisor . . . Gerry Walger to Quality Control Engineer.

**Quincy Shipbuilding:** Edward M. Suraci, Michael P. Staid, Kenneth P. Rusterholz and Gerard J. Grippo were promoted to Foreman, Testing . . . John F. Hancock to Design Supervisor . . . William H. Locke to Superintendent, Powerhouse . . . Frank R. McNamara to Superintendent, Pipefitting . . . Philip D. Cabot to Engineering Supervisor, Marine.

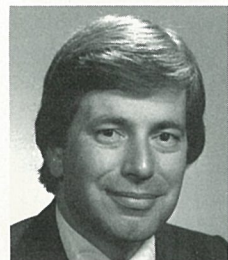
**DSD:** At Eastern Center, J. Johnson was promoted to Production Control Specialist . . . L. Gedeon to Specialist, Administration/Financial Analysis . . . R. Bremer to Senior Software Engineer . . . At Central Center, D. E. Mason to Supervisor, Engineering Software . . . At Western Center, D. R. Satchell to Supervisor, Engineering Software.

**Land Systems:** Henry Rolfe was promoted to Plant Engineering Supervisor . . . William Owens to Captain, Plant Protection . . . Victor LaFerre to Chief of Proposal Development . . . John Eccles to Deputy Program Manager-M1 . . . Timothy Grebik to Manager-Proposal Development . . . Ramesh Sapra to Chief of Estimating.



## Four Appointed to Key Posts In Cruise Missile Management

Additional appointments for Convair's Cruise Missile Program have been announced. Dr. J. T. Karam, formerly Program Director for the Medium Range



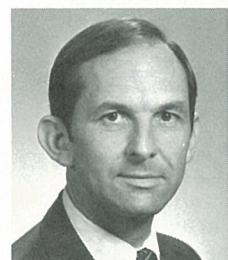
Karam



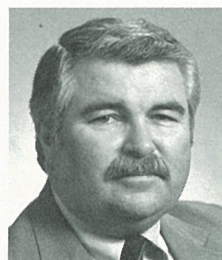
Wolff

Air-to-Surface Missile, has been named All-Up-Round System Engineering & Integration Agent Director, and J. F. Wolff has been named Program Director of MRASM Development, replacing Karam.

In addition, J. F. Thompson has been appointed Program Director for Dual Source Production, and B. A. Ganoe has



Thompson



Ganoe

been named as Program Director - Sea Launched Cruise Missile Development, replacing Thompson.

Karam joined General Dynamics in 1978 after serving 14 years in the U.S. Air Force, much of the time in research and development. He holds a Bachelor of Science in Mechanical Engineering from the University of Arkansas and a Master

### F-16s to Use New Solid-State Flight Data Recorders

F-16Cs and Ds will be the first military aircraft to fly with a new solid-state flight data recorder. The U.S. Air Force, Army and Navy plan to develop the recorder as standard equipment for their fighter, trainer and attack aircraft.

The three services recently issued a specification for the recorder and named Fort Worth to manage the equipment's development, fabrication and testing, since the F-16C and F-16D will be the initial users.

Early production F-16Cs and F-16Ds, to be delivered beginning in 1984, will have wiring and installation provisions to accommodate the new avionics equipment. The avionics systems will be added to these aircraft by retrofit upon completion of the development effort.

A second phase of the effort, to be managed by the Air Force Air Systems Division, will involve other aircraft types identified as potential users.

"State-of-the-art technology will allow the new recorder to have major advantages over existing military systems," said Dain Hancock, Fort Worth's F-16 Multinational Staged Improvement Program Director. "A significant increase is planned in the amount of airborne data that can be processed and recorded on operational aircraft, while also reducing the system's size, weight and life-cycle cost."

The system comprises three major components: a signal acquisition unit, to receive service-life information from the airframe structure and engine; an auxiliary bulk memory unit, to store the data, and a crash-hardened memory unit that is comparable to the crash recorders now used by commercial airlines.

of Science in Aerospace from the Air Force Institute of Technology. He earned his doctorate in fluid dynamics from Purdue University.

Wolff has been with Convair since 1980, following retirement from the U.S. Air Force. He has a Bachelor of Science in Mechanical Engineering from Oklahoma State University and a Master of Science in Systems Engineering from the Air Force Institute of Technology.

Thompson has been with General Dynamics since 1963, serving in increasingly responsible engineering and project positions with the Convair and Astronautics divisions. He earned both a bachelor's and a master's degrees from Georgia Institute of Technology in Industrial Management.

Ganoe has held a series of positions with Convair's Research and Engineering Department since joining the company in 1963. He holds a Bachelor of Science in Mechanical Engineering from Rice Institute.

### Directors Named For Space Projects

Two executives have been appointed to new posts at Convair. Howard M. Bonesteel has been named Operations Product Line Director for Space Programs production, and Martin K. Winkler has been named Director of the Atlas/Centaur program, the position being vacated by Bonesteel.



Bonesteel



Winkler

Bonesteel joined Convair in 1958 and has held a series of increasingly responsible engineering and management positions related to space launch vehicles, including the Atlas, Centaur and Space Shuttle programs. He holds a Bachelor of Science degree in Aeronautical Engineering from Rensselaer Polytechnic Institute.

Winkler, who has been Director of Avionics since 1979, has been with Convair since 1964, working primarily in the area of guidance and avionics. He holds a Bachelor of Electrical Engineering degree from Cornell University and a Master of Science in Aerospace Sciences and Guidance and Control from the University of California, San Diego.

### R. P. Di Nal Named Director of Avionics

R. P. Di Nal has been appointed Director - Avionics for Convair, replacing Martin K. Winkler, who was named Director - Atlas/Centaur Program.

Di Nal has been serving as Manager of Space Avionics and has been with General Dynamics since 1963. He received his Bachelor of Electrical Engineering from Rensselaer Polytechnic Institute and his Master of Science in Electrical Engineering from San Diego State University.



Di Nal

### Submarine Delivered

Electric Boat delivered the fast-attack submarine *Albuquerque* (SSN 706) to the U.S. Navy April 14th, six weeks ahead of schedule.

The 360-foot, 6,900-ton submarine is the third consecutive vessel delivered early by the shipyard.

The *City of Corpus Christi* was delivered one month early last December. *Michigan*, the second Trident, was delivered two months early last August.



**Significant Improvement.** Mike Perry (left), Group Leader of Bonded Structures, Karin Ozudogru, UCSD Library, and Gene Butler, Operations General Supervisor of Plastics, inspect some of the newspapers being dried at Convair. Butler and Perry developed a process of drying the water-soaked papers that preserved the only archive copies of the papers.

## Convair Aids San Diego Library In Preserving Newspaper Files

A stopped up drain at the San Diego City Library and a call for help to Convair has led to the development of a technique for preserving wet newspapers that has been described as "... a significant improvement in paper preservation."

Over a mid-December weekend, a cleaning pad left in a sink at the library resulted in an overflow of the air conditioning system and flooding of three floors of the building. Stored on one of the floors were the only existing copies of the last 15 years of the *San Diego Union and Tribune*. More than 1,200 copies of the newspapers were soaked with water, air conditioning fluid and dirt.

When the damage was discovered on the morning of December 13th, library officials called Karin Ozudogru, Curator of the Slide and Photograph Collection at the University of California in San Diego, and head of the University Library's preservation team. She told the San Diego librarians to wrap the damaged papers in freezer paper and to freeze them within two days if possible, to prevent paper swelling, color bleeding, and mildew.

Once the newspapers had been stabilized, Ozudogru asked Convair for help. She had earlier discovered that the company's metal bonding and plastics operations had equipment that might be suitable for drying the papers. Gene Butler, Operations General Supervisor of Plastics at the Lindbergh Field plant, agreed to help as a community service on a time- and space-available basis.

One problem surfaced almost immediately. While the basic techniques for freeze drying water-damaged books was known,

### Convair Savings At \$135 Million In Cost Control

Convair realized savings of more than twice the 1982 goal of the division's Cost Reduction/Value Control Programs - total savings were more than \$135 million, compared with the year's goal of \$66.8 million.

J. M. Ibarra, Jr., Administrator of Convair's Cost Reduction/Value Control Program, said that in the fourth quarter, Convair reported more than \$53 million in savings against a quarterly goal of \$16.7 million.

The Employee Suggestion Program also produced savings for the company and prizes for the participating employees. A total of 826 suggestors shared \$111,421 in awards and generated \$1,363,172 worth of first-year savings to Convair. These figures represented an improvement of nearly 27 percent over 1981 and were 38.1 percent better than the 1982 goal, according to Ibarra.

Ibarra reported that 1982 closed with 3,260 suggestions submitted, 3,101 cases that reached a final disposition, and a year-end backlog of 1,343 suggestions still being worked.

there was nothing in the preservation literature that dealt with newspapers. This was compounded by another problem discovered when another library had used the freeze and vacuum drying process in 1978. When paper is completely dried, it becomes very brittle, and in the earlier case, books had had to be rehumidified for up to two months in order to bring the moisture content back to the normal six percent.

Butler, Ozudogru, and Mike Perry, Group Leader of bonded structures, began a series of experiments using an autoclave for a combination of heat and vacuum drying. Once the various time and temperature limits were established, operations were transferred from the autoclave, which could handle only a few papers at a time, to one of two metal bonding presses, capable of drying 80 to 100 papers at a time.

In this process, the frozen bundles of newspapers are placed on the steam-heated press, sandwiched between layers of polyester blanket and absorbent paper. After the press is closed, the temperature is brought to 160-170 degrees and a partial vacuum is used to draw off the water.

While the bonding press takes longer to dry the papers than the autoclave, normally about eight hours, the combination of larger capacity and better control over the residual moisture made it the best tool for the project. Tests have shown that the newspapers have been coming out of the press at very close to the desired six percent moisture content, eliminating the need for the rehumidifying step of earlier processes.

Now that 1,236 papers have been dried and returned to the public library, Ozudogru and Butler plan to document the process in a technical paper, so that librarians around the world can benefit from their experience. A list of industries who use this equipment will be a part of their report, to give disaster-struck librarians potential local sources for help.

## SM-2 Sets New Altitude Record

An extended range Standard Missile-2 using a new booster has set a new altitude record in scoring a tactical kill on an incoming target drone during tests conducted from the USS *Mahan*.

The Pomona-produced missile was launched from the destroyer as part of operational tests at the Atlantic Fleet Weapons Range, near Puerto Rico.

The extended range missile was able to fly faster and higher than ever before because of the effectiveness of the Mark 70 booster, manufactured by Thiokol/Huntsville. The success of the test is also attributable to new improved signal processing.

More than 40 extended range Standard Missile-2 Block II versions are scheduled to be delivered to the U.S. Navy next year, leading to eventual full production.

# GD World

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## USAF Wing at Torrejon AB, Spain, Officially Transitions to F-16 Falcon

The 401st Tactical Fighter Wing at Torrejon AB, Spain, celebrated its 40th Anniversary April 5th in a ceremony that officially marked the transition of the wing from the F-4 Phantom to the F-16 Falcon.

In the long history of the unit, pilots and aircrews assigned to it have flown the B-17, the F-86, the F-100 and the F-4. Conversion to the F-16 began last December with the arrival of the first four F-16s for maintenance personnel training.

Among the dignitaries attending the ceremony were: U.S. Ambassador to Spain Terence A. Todman and Lt. Gen. Robert W. Bazley, Vice Commander-in-Chief United States Air Forces in Europe.

"The F-16 will increase our ability to accomplish the wing's mission due to its greater technology and advanced weapons systems," said Col. Albert L. Logan, Commander of the 401st.

"It is a magnificent aircraft — the newest fighter in the Air Force inventory — and all of us at Torrejon feel proud to

be associated with it."

Ted S. Webb, Vice President for F-16 Programs, said that Fort Worth was committed to delivering high quality aircraft and in helping to keep them in the air.

"We are pleased that the 401st is joining the other bases in Europe, the Middle East, the Orient as well as the United States, in carrying out an important defensive mission with the F-16."

Complete conversion by the 401st to the Falcon is expected by the middle of next year.

The F-16 base activation at Torrejon, which is near Madrid, was the second in as many months. The 58th Tactical Training Wing at Luke AFB, Ariz., made the transition from the F-4 to the F-16 in February.

To date, the F-16 is being flown from bases in the United States, Belgium, Denmark, West Germany, the Netherlands, Norway, Egypt, Israel, Korea and Pakistan.

## Convair Atlas-E Boosts Satellite With Weather/Rescue Package

A Convair-built Atlas-E boosted a NOAA-E spacecraft into Sun-synchronous, near-polar orbit from Vandenberg AFB, Calif., on March 28th, placing additional weather forecasting capability in space 450 nautical miles above the earth.

In addition to providing weather data to ground stations, the NOAA-E satellite carried a Search And Rescue (SARSAT), instrumentation package, designed to acquire, track and locate emergency locator transmitters currently in use on approximately 200,000 aircraft in the United States, as well as 6,000 ships.

The SARSAT program is a joint effort of Canada, France, the U.S. and the Soviet Union to develop satellite relay of distress signals from downed or lost aircraft or ships to ground stations. A Soviet SAR-equipped navigational satellite launched in June 1982 has already been credited in assisting the saving of 19 lives through February.

The Atlas-E launch vehicle is a refurbished and modified Atlas ICBM. Beginning in 1963, it served on nuclear alert as a part of the Strategic Air Command until its replacement by the solid-fueled Minuteman, and since then has been in storage awaiting its date with NOAA-E and the Vandenberg launch pad.

NOAA-E, the fifth in a series of 11 satellites, has been developed to give scientists comprehensive meteorological and environmental information.

Advanced instrumentation on the satellite will measure the earth's atmosphere, its surface and cloud cover, and particulate energy disposition at the satellite altitude. As a part of its mission, it also receives, processes and retransmits data from free-floating balloons, buoys and remote automatic observation stations distributed around the world.

## Thunderbird F-16s Begin Show Schedule

*Continued from Page 1*

the horizon and split to go in opposite directions.

Both the minimum and maximum show speeds are demonstrated in one maneuver when four aircraft fly over the runway lengthwise and seem to almost hang. When they are about halfway past the crowd, a soloist appears on the right horizon and, flying in the same direction, overtakes them in seconds.

Many spectators commented that the current show has a faster pace than previous ones because of the F-16's ability to return to the center of audience attention quickly for the next maneuver. Latham said several maneuvers have been added to the show to feature the F-16's turning capability.

The Thunderbird F-16s are the same as standard U.S. Air Force Falcons except for minor modifications such as the addition of a smoke system. The aircraft can be repainted and restored to combat-ready status within 72 hours.

The Thunderbirds are scheduled to fly 80 shows at 67 locations in the United States during 1983. The second official show, at Sheppard AFB, Tex., followed the first by just 24 hours.

The Thunderbirds are scheduled to perform in Fort Worth at the Carswell AFB open house on April 30th. Six additional shows are scheduled to take place near General Dynamics facilities this year.

The F-16's long range will allow the Thunderbirds to perform at locations outside the United States. A European tour has been announced for 1984 and tours in Mexico and Central America are currently in planning.

## Outstanding Records Earn Seven GD Units Awards for Safety

Seven General Dynamics divisions and subsidiaries were recognized recently for their excellent safety performance during 1982. Oliver C. Boileau, General Dynamics President, announced that "Certificates of Achievement for Excellence in Safety Performance in 1982" had been earned by Convair, Electronics, Fort Worth, Marblehead Lime, Material Service, Pomona and Quincy Shipbuilding.

Each of these operating units demonstrated outstanding safety records compared to their industry in 1982. In addition, each conducted a comprehensive safety and health program which met established corporate standards.

This recognition is limited to those divisions which have injury rates at least 25 percent lower than the national average for their industry.



**New F-16 Wing.** The 401st Tactical Fighter Wing, based at Torrejon AB, Spain, officially became the latest USAF wing to operate the F-16 Falcon in a ceremony on April 5th. Above, a pair of F-16s from Torrejon fly over the city of Madrid. Below, Ted S. Webb, Fort Worth Vice President — F-16 Programs, presents an F-16 model and a plaque to Maj. Gen. Robert W. Clement (left), Commander of the 16th Air Force; Lt. Gen. Robert W. Bazley, Vice Commander-in-Chief, United States Air Forces in Europe, and Col. Albert Logan, Commander of the 401st TFW. At bottom, at the conclusion of the ceremony, guests inspect an F-16.



## AFTI/F-16 Test Flights Continue

The latest advances in aircraft handling and maneuvering are being proven during the continued flight testing of the AFTI/F-16 aircraft at Edwards AFB, Calif.

The modified F-16, which made its maiden flight at Fort Worth last summer, is serving as a test bed for the U.S. Air Force Advanced Fighter Technology Integration study.

One feature being tested is the aircraft's capability to make flat turns without banking the wings.

The flat turns are made possible by movable, rudder-like devices, called canards, which are mounted on the underside of the forward fuselage and work in conjunction with the rudder on the vertical tail," said Larry Lydick, Deputy Program Manager for the project.

"The system also improves the aircraft's maneuvering performance, resulting in more precise and more symmetrical rolls, and test results have shown that the AFTI/F-16's unique control system gives the aircraft outstanding qualities for landing approach," said Lydick.

The control system improvements, made possible through a digital flight control system, are designed to help fighter pilots maneuver to their targets and to reduce the number of control movements that are necessary for target tracking. The flat turn capability is expected to increase pilots' direct control during tracking and to make small heading changes while flying at very low altitudes.

Evaluations have shown that the structural modifications to the aircraft, which include the installation of the canards and a dorsal fairing which extends from aft of the canopy to the vertical tail, have had only minor effect on the F-16's basic aerodynamic drag. The dorsal fairing houses extensive instrumentation equipment that has been installed for use in the tests.

Variations of some AFTI/F-16 subsystems, including a dual-multiplex stores management computer and dual cathode-ray tube displays, will emerge in F-16C and F-16D aircraft produced under the Multinational Staged Improvement Program.

A recent milestone in the evaluation program was preliminary experiments using voice command. This innovation allows the pilot to literally tell his avionics system, and therefore the whole integrated aircraft, what he wants to do next. Development of this technology to its full maturity will mark a major step in pilot/vehicle integration.

The aircraft has made approximately 55 flights to date and is scheduled to fly approximately 50 more times between now and July 1983, when it will be returned to Fort Worth for additional modifications.



## Grimes, McSweeney Named Corporate Vice Presidents

Two General Dynamics executives, Gary S. Grimes and John E. McSweeney, have been elected Corporate Vice Presidents by the company's Board of Directors.

Grimes, 40, who has been serving as General Manager of Quincy Shipbuilding since 1980, will continue to head the division with the title Vice President-General Manager.

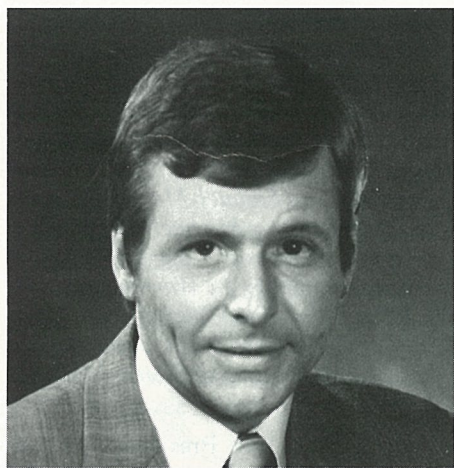
McSweeney, 46, was named Vice President-General Manager of Convair last month, after serving as Vice President and Deputy General Manager of the division since December 1982.

Grimes joined General Dynamics in 1969 as a management intern in the corporate office and in 1970 was assigned to Quincy Shipbuilding as General Supervisor of Production Support. He later assumed increasingly more responsible positions at the division including Director of Planning and Facilities and Controller. From 1977 to 1980, he served as Deputy General Manager of Electric Boat.

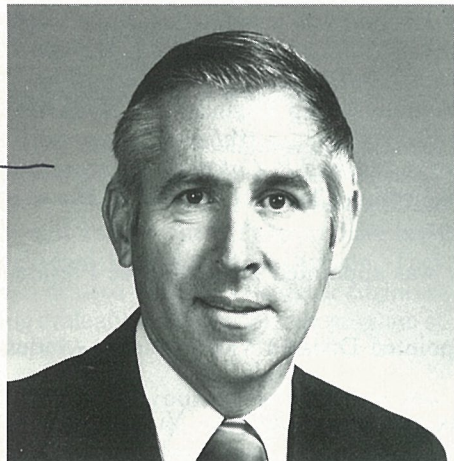
A native of Schenectady, N.Y., Grimes was graduated from Alfred (N.Y.) University, with a Bachelor of Arts degree in Psychology and holds a Master's of Business Administration degree from Syracuse University.

McSweeney joined General Dynamics at Pomona in 1961 as a Senior Electronics Engineer and held a number of engineering and management positions at that division, including Program Director for the U.S. Navy's Phalanx shipboard gun defense system. He was Division Vice President and Deputy General Manager-Finance and Administration prior to being transferred to Convair in 1982.

A native of San Mateo, Calif., McSweeney received a Bachelor of Science degree in Electrical Engineering from Loyola University in Los Angeles and a Master of Science degree in Electrical Engineering from the University of Colorado.



Gary S. Grimes



John E. McSweeney

## Multiyear Contract

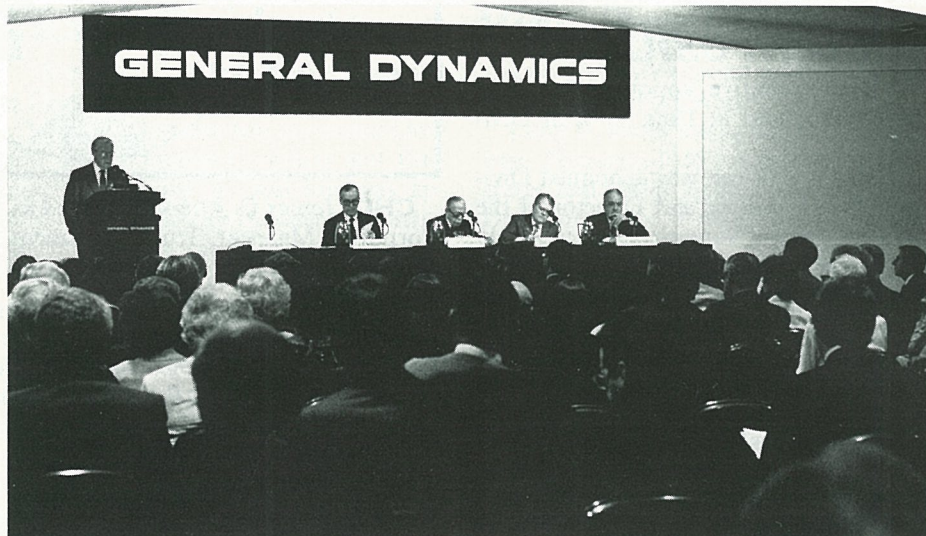
Electronics has been awarded a multi-year contract from Fort Worth for production of 16 F-16 Avionics Intermediate Shop sets.

The shops contain the necessary test equipment to support the test and maintenance of the display and avionics systems of F-16 Falcon fighter aircraft. This new contract calls for test equipment capable of supporting the new F-16C and D models as well as the earlier A and B models.

Vol. 13 No. 5

# GD World

May 1983



**Annual Meeting.** David S. Lewis, Chairman and Chief Executive Officer, reported on the general condition of the company during the General Dynamics Annual Meeting in St. Louis on May 5th. Seated (from left) are John P. Maguire, Vice President and Secretary; Henry Crown, Chairman of the Executive Committee; Oliver C. Boileau, President, and Gordon E. MacDonald, Executive Vice President-Finance. After the meeting (below), Mr. Lewis met with business reporters and shareholders.



## Chairman Reports

## General Dynamics Prospects, Financial Condition Best Ever

David S. Lewis, General Dynamics Chairman and Chief Executive Officer, told shareholders attending the company's annual meeting in St. Louis on May 5th that "General Dynamics is in its strongest financial condition and has better prospects for the future than at any time in its history."

Reporting on first quarter 1983 results, Lewis said earnings were \$56.8 million, or \$1.03 per share, on sales of \$1.8 billion compared to earnings of \$28.3 million, or 51 cents per share, on sales of \$1.2 billion for the first quarter of 1982. The net earnings in the first quarter of 1982 were reduced by a loss from the discontinued telecommunications operations of \$12 million, or 23 cents per share.

"The first quarter 1983 results continued the progress in operating earnings that was evident in the second half of last year and were a record for any first quarter," he said. At the end of the quarter the company's funded backlog was \$14.3 billion and funded and unfunded backlog totaled \$17.8 billion.

In his report to the shareholders on the condition of the company, Lewis said all of the divisions and subsidiaries are in sound condition, well facilitated, keeping up their development work at healthy levels and recording good earnings, with the exception of those commercial operations most directly impacted by the adverse economic climate.

He said that the U.S. Navy has reaffirmed its confidence in Electric Boat by the award of \$1.1 billion in new contracts over the past year, and that Electric Boat is once again reporting reasonable earnings on its very important submarine contracts.

Lewis said operations at Electric Boat are proceeding very smoothly and that the SSN 688-class fast-attack and Trident

ballistic missile submarines are being delivered ahead of the agreed-upon schedules and the quality of the boats is excellent.

Land Systems is now fully integrated into General Dynamics, Lewis said, and the U.S. Army is enthusiastic about the performance of the division's M1 tanks in operational service.

"Congressional support is now strong for the M1, more so than at any time in recent years, and we believe that the prospects for profitable, successful long-term business operations at Land Systems are very good," he said.

Lewis reported Quincy's backlog has increased from \$105 million a year ago to

**Continued on Page 4**



**Fort Worth Achievement.** Dr. Thomas E. Cooper, Assistant Secretary of the Air Force for Research, Development and Logistics, presents the 1982 U.S. Air Force Contractor Value Engineering Achievement Award to Herbert F. Rogers (center), Fort Worth Vice President and General Manager. At right is J. D. Jackson, Manager of Cost Reduction and Value Control.

## 100th Phalanx Is Operational With U.S. Navy

The 100th Phalanx close-in weapon system, produced by Pomona, has become operational in the U.S. Navy when it was declared in service on the USS *John A. Moore*, a guided missile frigate.

The USS *Moore*, currently stationed at San Diego, is the 10th guided missile frigate to have Phalanx aboard. Phalanx is now installed on a variety of U.S. Navy ships, including aircraft carriers, cruisers and frigates.

Late last year, four systems were installed aboard the newly recommissioned USS *New Jersey*, making her the first U.S. Navy battleship to be outfitted with Phalanx. Two systems have also been installed aboard the USS *Ticonderoga*, the first of the Navy's new Aegis-class guided missile cruisers.

The Navy plans to install Phalanx aboard 35 ship classes ranging from aircraft carriers to frigates.

## Fort Worth Wins Award From USAF

The U.S. Air Force has presented Fort Worth the 1982 Contractor Value Engineering Achievement Award in recognition of \$24 million in savings in the F-16 program. The presentation was made in the Pentagon on April 19th.

Vice President and General Manager Herbert F. Rogers, on behalf of the division, accepted a plaque and an accompanying certificate signed by Secretary of the Air Force Verne Orr. The certificate reads:

"General Dynamics has demonstrated a sincere interest in reducing F-16 weapon system costs through a concerted value engineering effort. Value Engineering Change Proposals (VECPs) approved by the F-16 System Program Office in Fiscal Year 1982 contributed to a cost avoidance of \$24 million. General Dynamics Fort Worth Division's continued effort to provide quality Value Engineering Change Proposals is most commendable."

The division's 100 percent approval rate on VECPs submitted was also cited at the award presentation.

In accepting the award, Rogers said, "All employees who contributed to the effort that brought us this honor should be congratulated for a job well done. We should all strive toward keeping our product's cost down . . . VECPs are one of the ways we can do this."

**Continued on Page 4**

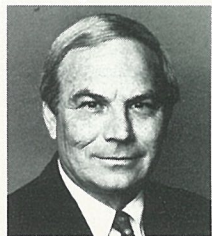


**At CHQ****Five Executives Appointed Staff Vice Presidents**

Five Corporate executives have been appointed Staff Vice Presidents.

Fred J. Bettinger was appointed Staff Vice President-Public Affairs; John G. Lemon, Staff Vice President-Internal Audit; William M. McCurdy, Staff Vice President-Pricing and Contracts Analysis; Douglas C. McPherson, Staff Vice President-Corporate Taxes and Insurance, and Charles D. Walbrandt, Staff Vice President-Employee Benefit Trust-Investments.

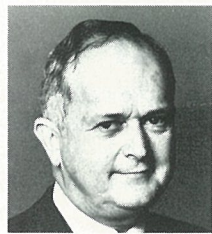
Bettinger, 49, has been with General Dynamics for 25 years, the last five years as Corporate Director-Public Affairs and

**Bettinger**

Advertising at Corporate Headquarters. Previously, he had been Director of News and Information for the western region. His previous service included public affairs positions at the Convair and Fort Worth divisions.

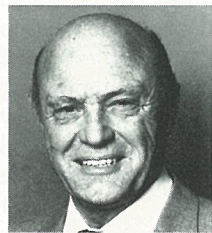
A native of Milwaukee, Wis., Bettinger was graduated from Marquette University in 1956 with a Bachelor of Science degree in Journalism.

Lemon, 55, who has been Corporate Director-Internal Audit since 1973, joined General Dynamics in 1969 as Director of Government Contract Settlements.

**Lemon**

A native of Baltimore, Md., Lemon was graduated from Johns Hopkins University in 1951 with a Bachelor of Science degree in Business Administration. Before coming to General Dynamics, he worked for Martin Marietta and General Electric.

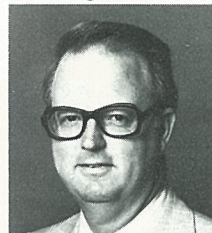
McCurdy, 58, who has been Corporate Director-Contracts and Pricing Analysis since 1981, joined General Dynamics at

**McCurdy**

Fort Worth in 1946 and interrupted his service with the company in contracts and cost analysis positions to work with the Douglas Aircraft Co. from 1964 to 1968. He returned to General Dynamics in the corporate office in 1968 and held contract management positions at Convair and Fort Worth.

A native of Idalou, Tex., McCurdy was graduated from Texas Christian University in 1950 with a Bachelor of Arts degree in Mathematics and Physics.

McPherson, 43, joined the company in 1978 as Corporate Director of Taxes after working for Northrop, Lockheed Aircraft and Litton Industries as a tax counsel and in tax administration positions.

**McPherson**

A native of Topeka, Kan., McPherson was graduated from the University of Colorado in 1961 with a Bachelor of Science degree in Accounting and received a Doctor of Law degree from Catholic University of America in 1968.

Walbrandt, 44, who has been Corporate Director-Employee Benefit Trust-Investments since 1976, joined General Dynamics in 1974 as Manager-Employee Benefit Trust-Investments.

**Walbrandt**

A native of Hudson, Wis., he was graduated from the University of Wisconsin in 1960 with a Bachelor of Science degree in Economics and received a Master of Business Administration degree in Finance from St. Louis University in 1973.

**At DSD****Breen, Huckaby, Straeter Named Vice President**

Three executive appointments have been announced at Data Systems Division.

Bernard J. Breen was appointed Division Vice President and Director of the Eastern Center, Norwich, Conn.; Donald J. Huckaby, was appointed Division Vice President and Director of the Central Center, Fort Worth, Tex., and Terry A. Straeter, was appointed Division Vice President and Director of the Western Center, San Diego, Calif.

Breen, 40, has been Director of the Eastern Center since June 1982. He joined General Dynamics in 1966 as a Scientist Mathematician at Electric Boat. He held increasingly more responsible positions there until 1977, when he was named Corporate-wide Applications Consultant in Data System's headquarters in St. Louis.

**Breen**

A native of Norwich, Breen was graduated from Purdue University in 1966 with a Bachelor of Science degree in Mathematics and Computer Science.

Huckaby, 48, has been Director of the Central Center since August 1973. He joined General Dynamics in 1955 as a

**Huckaby**

Technical Analyst at Fort Worth. He held increasingly more responsible positions and in 1967 was named Chief of the Scientific Computing Labs at the division. A native of Brownwood, Tex., Huckaby was graduated from Howard Payne College in 1955 with a Bachelor of Science degree in Mathematics and from Texas Christian University in 1958 with a Master of Science degree in Mathematics.

Straeter, 40, has been Director of the Western Center since January 1982. He joined Data Systems in 1979 as Director-

**Straeter**

Technical Software at its headquarters and was named Director-Engineering Software and Computer Service in 1981. A native of St. Louis, Straeter was graduated from William Jewell College in 1964 with a Bachelor of Arts degree in Mathematics, from the College of William and Mary in 1966 with a Master of Arts degree in Mathematics and from North Carolina State University in 1971 with a Doctor of Philosophy degree in Applied Mathematics.

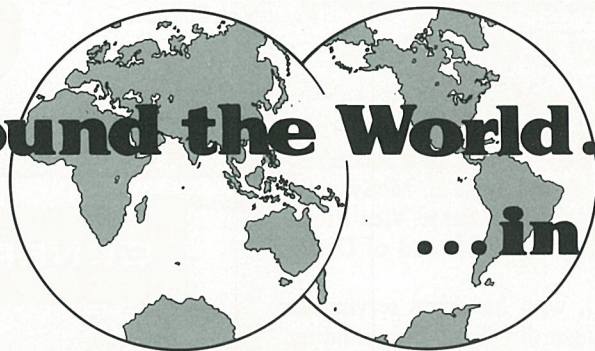
**Land Systems Delivers 1,000th M1 Abrams Tank**

Land Systems delivered the 1,000th M1 tank to the U.S. Army at the Detroit Arsenal Tank Plant in April.

Both DATP and the Lima Army Tank Plant each delivered 30 M1 tanks for the month bringing the combined total to 1,048 tanks delivered since the first M1 tank was produced at LATP in February 1980.

Commenting on the 1,000th M1 tank, Lt. Col. Michael W. Boudreau, DATP Commander, said, "It took us two-and-a-half years to deliver the first 500 tanks and only 8 months to deliver the second 500. That's real progress."

The Government has authorized more than 7,000 M1 tanks to be built by the end of the decade. Included in this total will be the new M1E1, which has improved armor and firepower. The M1E1 is now being tested, and production deliveries are scheduled to begin in 1985.

**Around the World... ..in GD**

**CHQ:** James G. Knighton joined as Associate Auditor . . . Kurt V. Anderson as Corporate Manager, Trust Investment . . . Linda R. DeVaul as Auditor . . . Dale LeSturgeon was promoted to Corporate Manager, Telecommunications.

**Fort Worth:** Larry R. Jones was appointed Division Vice President - F-16 International Programs . . . Dan S. Zimmer to Division Vice President - Industrial Relations . . . C. S. Bogle was promoted to Program Specialist . . . R. G. Brewer to Foreman . . . J. E. Brunette to Superintendent . . . B. L. Chambers to Manufacturing Support Equipment Supervisor . . . M. Comeau to Senior Quality Assurance Engineer . . . G. Donathan Jr. to Engineering Administrative Group Supervisor . . . S. D. Fulgham to Senior Management Systems Analyst . . . E. M. Guiney and R. L. Thompson to Quality Assurance Field Engineer . . . M. A. Harwell to Project Tool Engineer . . . O. H. Hill to Manager of Support Equipment . . . B. M. James to Senior Manufacturing Technology Engineer . . . D. Jansky to Senior Manufacturing Support Equipment Engineer . . . B. F. Langley and R. M. McIntosh to Senior Program Analyst . . . K. D. League and G. J. Melven to Manufacturing Technology Supervisor . . . P. C. Leamer and O. D. Lively to Senior Project Engineer . . . W. R. McCall, H. S. Simrin, F. G. Whitehouse III and J. J. Nash to Engineering Chief . . . C. L. McNulty to Chief of Manufacturing Technology . . . S. C. Mercer and R. M. Stevenson to Engineering Manager . . . V. Panzera to Financial Supervisor . . . P. D. Plumlee to General Foreman . . . C. O. Ray to Material Program Administrator . . . S. Zamora and S. H. Teikling to Senior Field Service Engineer . . . J. R. Hard to Industrial Engineering Specialist . . . J. C. Hobbs to Manufacturing Technology Engineering Specialist . . . D. C. Lorenzo to Planning Specialist . . . D. P. McCarley to Project Coordinator . . . P. A. McKeown to Quality Assurance Engineer . . . M. J. Nipper to Marketing Specialist . . . J. D. Paige to Manager of Quality Assurance . . . T. C. Reed to Manufacturing Control Supervisor.

**Pomona:** James A. Dematteis was appointed Division Vice President and Controller . . . C. Larry McMillan was appointed Division Vice President Industrial Relations . . . Dean J. Barnes was promoted to Chief of Production Support . . . Garland Chandler and Robert E. Crawford to Superintendent . . . Lawrence F. Freeland to Design Specialist . . . Clyde R. Ingels to Assistant Program Director . . . Raul Mendoza to Project Engineer . . . Lawrence G. Robb to Project Administrator . . . Marion J. Coffield to Manufacturing Supervisor . . . Don R. Jarvis to Production Control Supervisor . . . Chris D. Radcliffe to Plans & Analysis Staff Analyst . . . Helen B. Wagner to Material Control Supervisor . . . Richard M. Gillingham to Manager, Manufacturing & Material Control . . . John A. Thacker to Director, Test & Evaluation.

**Electric Boat:** Arthur M. Barton was appointed Division Vice President - Planning and Control . . . William W. Bennett was appointed Division Vice President and General Manager for Quonset Point Facility . . . Curtis B. Shellman Jr., was appointed Division Vice President - Operations . . . Bruce Hart and Alfred Gusler were promoted to General Foreman . . . Kenneth Adams to Supervisor, Overhaul Material Support . . . Raymond Allard to Senior Material Planning Supervisor . . . Michael Carboy and Mark Ortmayer to Nuclear Test Supervisor . . . David Cowart and Theodore Spanos to Test Operations Engineer . . . Samuel Martin to Senior Engineer . . . Richard Morin to Chief Test Engineer . . . Michael Rzewuski to Foreman . . . Donald Steamer to Director of Design Services . . . Raymond Bedard to Wage Administrator . . . John Casey to Superintendent . . . Warren Mayott to Manager, Welding & Materials Engineer . . . Jeffery Shafer to Chief of Engineering . . . Alfred Vallier to Benefits Administrator . . . At Quonset Point, John Stringer was promoted to Chief of Engineering . . . John Conway and Keith Moffat to Foreman II.

**Convair:** Charles D. Bohle was appointed Division Vice President and Controller . . . Augustus B. Daddi was appointed Division Vice President - Industrial Relations . . . William J. Vega was appointed Division Vice President and Program Director - Advanced Programs . . . Peter Keeping was promoted to Supervisor - Quality Assurance . . . Heintz W. Kubernus to Tooling Supervisor . . . William H. Lowe to Engineering Director . . . Michael McCullough to Manufacturing Operations Supervisor . . . Dale R. Nash to Program Group Engineer . . . Richard E. Schweitzer to Numerical Control Group Supervisor . . . Walter G. Boost to Industrial Engineering Operations Supervisor . . . Alfred R. Calabrese to Operations Supervisor . . . William D. Fortner to Engineering Chief . . . Harold F. Moore to Procurement Quality Assurance Supervisor.

**Quincy Shipbuilding:** Carl G. Miller was appointed Division Vice President and Controller

**Datagraphix:** E. L. Campbell was appointed Division Vice President - Industrial Relations.

**Electronics:** Larry F. Channave was appointed Division Vice President - Contracts and Estimating . . . Bernard A. Kulchin was appointed Division Vice President - Industrial Relations . . . C. Robert Stoker was appointed Division Vice President and Controller . . . Greg Burnett and Floyd Glick were promoted to Senior Quality Control Engineer . . . Dianne Clark-Morris to Senior Financial Analyst . . . Terry Grutta to Program Manager . . . John Rowe to Manager - Training and Development . . . Gerry Schmidt to Quality Reliability Control Specialist . . . Chris Turner to Manufacturing Engineer.

**Land Systems:** Lawrence Berthiaume was promoted to Layout & Receiving Inspection Supervisor . . . William Kovala to Inventory Control Supervisor . . . Dennis Sharrock to Configuration Management Supervisor . . . Clement Hess to Supervisor - Engineering . . . Martin Todorov to Recruitment & Development Supervisor . . . Alexander Mucci to Skills Performance Aids Supervisor . . . Laverne Biskner and Arthur Hoffman to Chief of Inspection . . . Karl Cavanary to Chief - Administration . . . Richard Gillette to Chief - Material Control . . . Mark Roualet to Quality Evaluation Chief . . . Roman Stefaniuk to Manager of Industrial Engineering . . . Edmond Jacques to Proposal Specialist . . . James Illsley to Chief of Material Planning & Control.



## At Convair

### Bohle, Daddi, Vega Appointed Vice Presidents

Three executive appointments have been announced at Convair.

Charles D. Bohle was appointed Division Vice President and Controller; Augustus B. Daddi was appointed Division Vice President - Industrial Relations; and William J. Vega was appointed Division Vice President and Program Director - Advanced Programs.

Bohle has served as Controller at Convair since 1981. He began his finance career at Lockheed Aircraft Corporation in 1961.



**Bohle**

In 1971, he joined Parker Hannifin as Controller before moving to Xerox in 1974. He holds a Bachelor of Science degree from the University of California and Master of Science degree from University of California at Los Angeles.

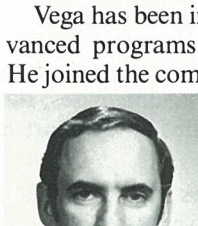
Daddi began his career with General Dynamics in 1952 and took his first assignment in Industrial Relations as a Labor Relations Representative in 1958. He later served as the Industrial Relations Representative at Vandenberg AFB, Calif., until 1965 when he transferred to Quincy Shipbuilding as the Management Relations Administrator and Labor Relations Manager.



**Daddi**

Daddi returned to Convair in 1974 and assumed the position of Manager of Employee Relations and then Manager of Management Relations, prior to his appointment as Director of Industrial Relations in 1979.

Vega has been involved in Convair's advanced programs for nearly three years. He joined the company in 1958 as a Senior Flight Test Engineer and has held increasingly more challenging project engineering assignments including Assistant Program Manager for the D-I Centaur Program and Director of Advanced Programs.



**Vega**

Vega holds a Bachelor of Science degree from Princeton University and a Master of Science degree from U.S. International University.

### Electronics Delivers Two AIS Stations To Serve New F-16s

The first two test stations of a planned eight-station/two shop Avionics Intermediate Shop for the F-16 Multinational Staged Improvement Program have been delivered by Electronics Division. They will be used to begin a two-year engineering evaluation/integration test program at Fort Worth.

MSIP incorporates advances in displays, avionics, and weapons delivery systems into the already-proven F-16 Falcon. The new AIS shops will provide increased testing support to include these new avionics packages in the F-16C and D models, which are due for delivery in late 1984.

## GD World

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G. Alexander Smith

## At Electronics

### Channave, Kulchin, Stoker Named Vice Presidents

Three Vice Presidents have been named at Electronics Division.

Larry F. Channave was appointed Division Vice President-Contracts and Estimating; Bernard A. Kulchin was appointed Division Vice President Industrial Relations; and C. Robert Stoker was appointed Division Vice President and Controller.

Channave began his career with General Dynamics in 1960, when he joined Stromberg-Carlson as a Contract Administrator. In 1962, he transferred to Electronics and over the years has held increasingly more challenging positions in contract administration and estimating. He holds a Bachelor of Science degree from Ithaca (N.Y.) College and is active in the National Contracts Management Association.



**Channave**

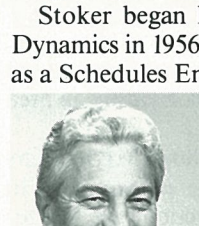
Kulchin joined Convair in 1957 and has held increasingly responsible positions including Manager of Labor Relations and Manager of Personnel. He has been Director of Industrial Relations at Electronics since 1970.



**Kulchin**

Kulchin holds a Bachelor of Arts and a Bachelor of Education degree from the University of Miami. He has been active with the Industrial Relations Research Association, Industrial Relations Committee for the American Electronics Association and has served as a faculty member of National University in San Diego.

Stoker began his career with General Dynamics in 1956 when he joined Convair as a Schedules Engineer. He held increasingly more responsible positions in estimating and financial control before being named Division Controller at Electronics in 1978. He holds a Bachelor of Science degree from the University of Kansas and is an active member of the Financial Executives Institute.



**Stoker**

Stoker began his career with General Dynamics in 1956 when he joined Convair as a Schedules Engineer. He held increasingly more responsible positions in estimating and financial control before being named Division Controller at Electronics in 1978. He holds a Bachelor of Science degree from the University of Kansas and is an active member of the Financial Executives Institute.

### John A. Thacker To Direct Test Systems Activities

John A. Thacker has been named Director of Test Systems Engineering at Pomona.

Thacker will be responsible for directing all activities of Test and Evaluation, Radio Frequency Test Systems Development and Electro-Optical Test Systems Development.



**Thacker**

A native of Alto, Tex., Thacker began his career at Pomona in 1963 as an Electrical Engineer. He subsequently held assignments as Senior Electrical Engineer, Group Engineer, and Section Head. In 1980, he advanced to Engineering Manager of Electro-Optical Test Systems Development, his most recent position, with responsibility for design, development, fabrication and check-out of the division's electro-optical test equipment.

Thacker earned a Bachelor of Science degree in Electrical Engineering from Howard University, Washington, D.C., in 1962, and a Master of Business Administration degree from California State University, Fullerton, in 1972.

## At Fort Worth

### Jones, Zimmer Appointed Vice Presidents

Two executive appointments have been announced at Fort Worth.

Larry R. Jones was appointed Division Vice President-F-16 International Programs, and Dan S. Zimmer was appointed Division Vice President-Industrial Relations.

Jones joined General Dynamics at Fort Worth in 1963 as a Senior Aerothermo Engineer and has since held a number of

increasingly responsible project and engineering management positions, including Director of Advanced Programs. He was named Director of F-16 International Programs

in 1981.

A native of Terrell, Tex., Jones holds a Bachelor of Science degree in Mechanical Engineering from Southern Methodist University, Dallas, Tex., and a Master of Science degree in Mechanical Engineering from the University of California at Berkeley.

Zimmer began his career with General Dynamics in 1963 in Rochester, N.Y., as an Equipment Engineer with the Stromberg-Carlson subsidiary.

In 1968, he transferred into Industrial Relations and held a number of management positions in that area with Stromberg-Carlson and the General Dynamics Data

Systems Division in St. Louis, Mo. He was named Director of Industrial Relations at Fort Worth in 1982.

A native of Pittsburgh, Pa., Zimmer served with the U.S. Air Force as a Telecommunications Technician from 1953 to 1957. He attended the Rochester Institute of Technology specializing in industrial and business management.

RAM, a high-firepower missile system designed to destroy attacking antiship missiles, is in the engineering development phase at Pomona.

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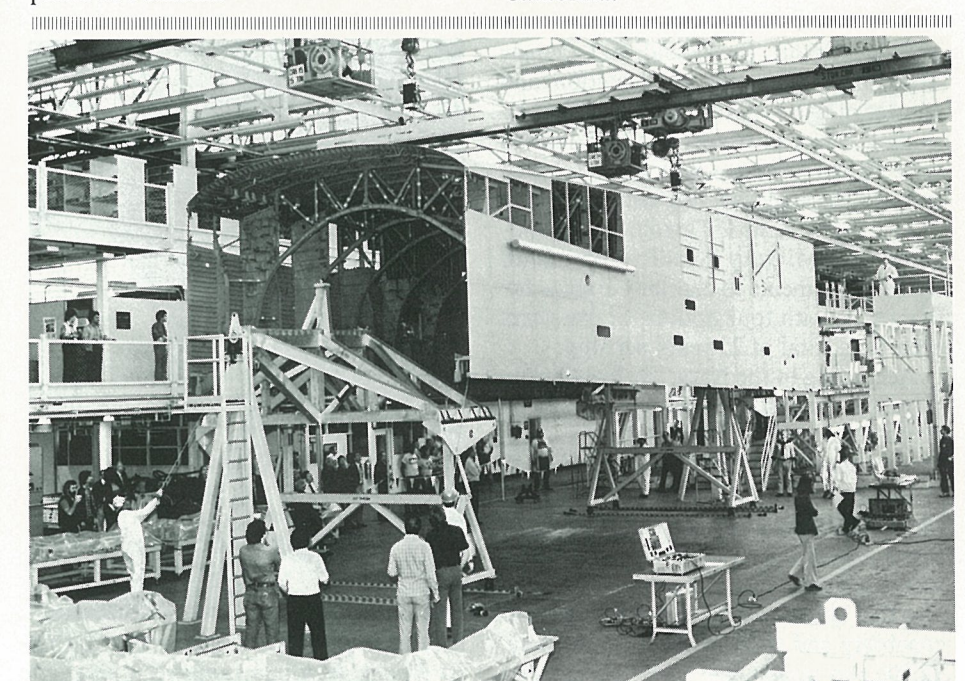
### RAM Passes Four Tough Shock Tests

A RAM launcher, launch control equipment and a missile round have successfully withstood four stringent shock tests without damage.

In the tests, the RAM system was installed on a barge, then exposed to the shock of high explosives detonated under the water.

The underwater explosions simulated the shock environment a ship may face in combat.

RAM, a high-firepower missile system designed to destroy attacking antiship missiles, is in the engineering development phase at Pomona.



**Nearing Delivery.** The midfuselage section of OV-104 "Atlantis," the fifth space shuttle, is lowered onto the handling tools before being loaded aboard a truck for shipment from Convair to Rockwell International's Palmdale, Calif., facility.

## At Pomona

### Dematteis, McMillan New Vice Presidents

Two executive appointments have been made at Pomona.

James A. Dematteis has been appointed Division Vice President and Controller, and C. Larry McMillan has been appointed Division Vice President-Industrial Relations.

Dematteis has served as Controller for Pomona since 1978 and prior to that was Controller for Electronics Division from 1973 to 1978. He joined General Dynamics at Convair in 1956 as a Junior Accountant and served in a number of financial positions at Convair before transferring to Electronics in 1972 as Manager of Accounting.

A native of Vista, Calif., Dematteis holds a Bachelor of Arts degree in Accounting from San Diego State University and a Master of Business Administration degree from Pepperdine University, Los Angeles.

McMillan has been Director of Industrial Relations at Pomona since 1980. He joined General Dynamics at Pomona in 1960 as a Thermodynamics Engineer and held a number of engineering and program management assignments until assuming the Industrial Relations position in 1980.

A native of Los Angeles, Calif., McMillan holds Bachelor of Science and Master of Science degrees in Mechanical Engineering from the University of Southern California.

McMillan has been Director of Industrial Relations at Pomona since 1980. He joined General Dynamics at Pomona in 1960 as a Thermodynamics Engineer and held a number of engineering and program management assignments until assuming the Industrial Relations position in 1980.

A native of Los Angeles, Calif., McMillan holds Bachelor of Science and Master of Science degrees in Mechanical Engineering from the University of Southern California.

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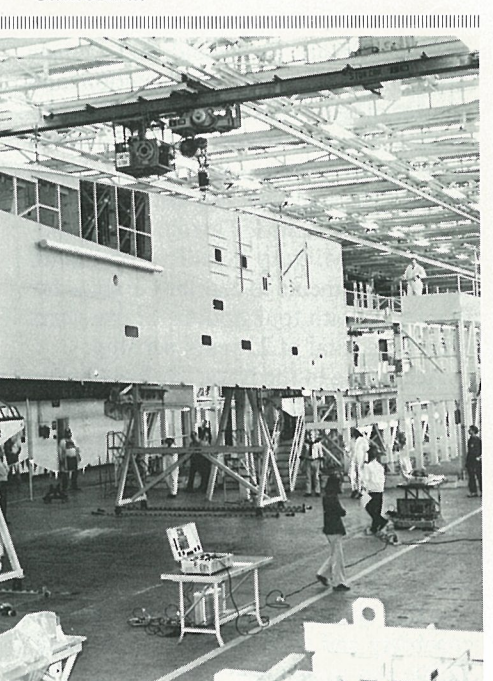
## At DatagraphiX

### Campbell Named Vice President

E. L. Campbell has been appointed Division Vice President-Industrial Relations for DatagraphiX, Inc.

Campbell began his career with General Dynamics in 1968 as the Compensation and Benefits Manager at DatagraphiX and has been Director of Industrial Relations since 1972.

Campbell holds a Bachelor of Science degree from the University of California at Los Angeles and a Master of Science degree from the University of Southern California.





# GD Prospects, Financial Health Highest Ever

Continued from Page 1

nearly \$800 million with the award of Navy contracts for the construction and charter of five T-AKX ships whose mission is the prepositioning of equipment for the Rapid Deployment Force. "This was the largest support ship contract awarded by the Navy in the past several years," he said.

Turning to the aerospace operations, he said that these divisions have consistently performed well over the past few years, with Fort Worth continuing to do an "absolutely superb job" in the production of F-16 aircraft and its support systems. More than 950 F-16s have now been delivered and the aircraft is receiving tremendously positive support from pilots and maintenance personnel around the world.

He said the two prototypes of the very advanced F-16XL have completed more than 340 test flights and that the aircraft has the potential for adding a new and very exciting dimension to the F-16 program.

Convair's Tomahawk Ground Launched Cruise Missile for the U.S. Air Force continues on schedule for deployment in Europe late this year, said Lewis, and the division expects to meet the schedules the Navy has established for introduction of various versions of the Tomahawk Sea Launched Cruise Missile to the fleet.

He said the Electronics and Pomona divisions continue to do very well on their programs. "Pomona's 1982 earnings were at an all time high, and this fine team is doing even better so far this year."

He said the commercial operations, Material Service, Marblehead Lime, Freeman United Coal and Datagraphix, have maintained their strenuous efforts to reduce overhead costs in order to lessen the impact of the recession on their lines of business, while at the same time continuing to buy new equipment and facilities to prepare themselves for better days ahead.

Lewis outlined the continuing aggressive actions the company is taking to insure growth in the future. Research and development expenditures will total approximately \$165 million in 1983. Capital investments for new engineering and production equipment and new facilities are expected to exceed \$200 million, compared with about \$135 million in each of the past two years.

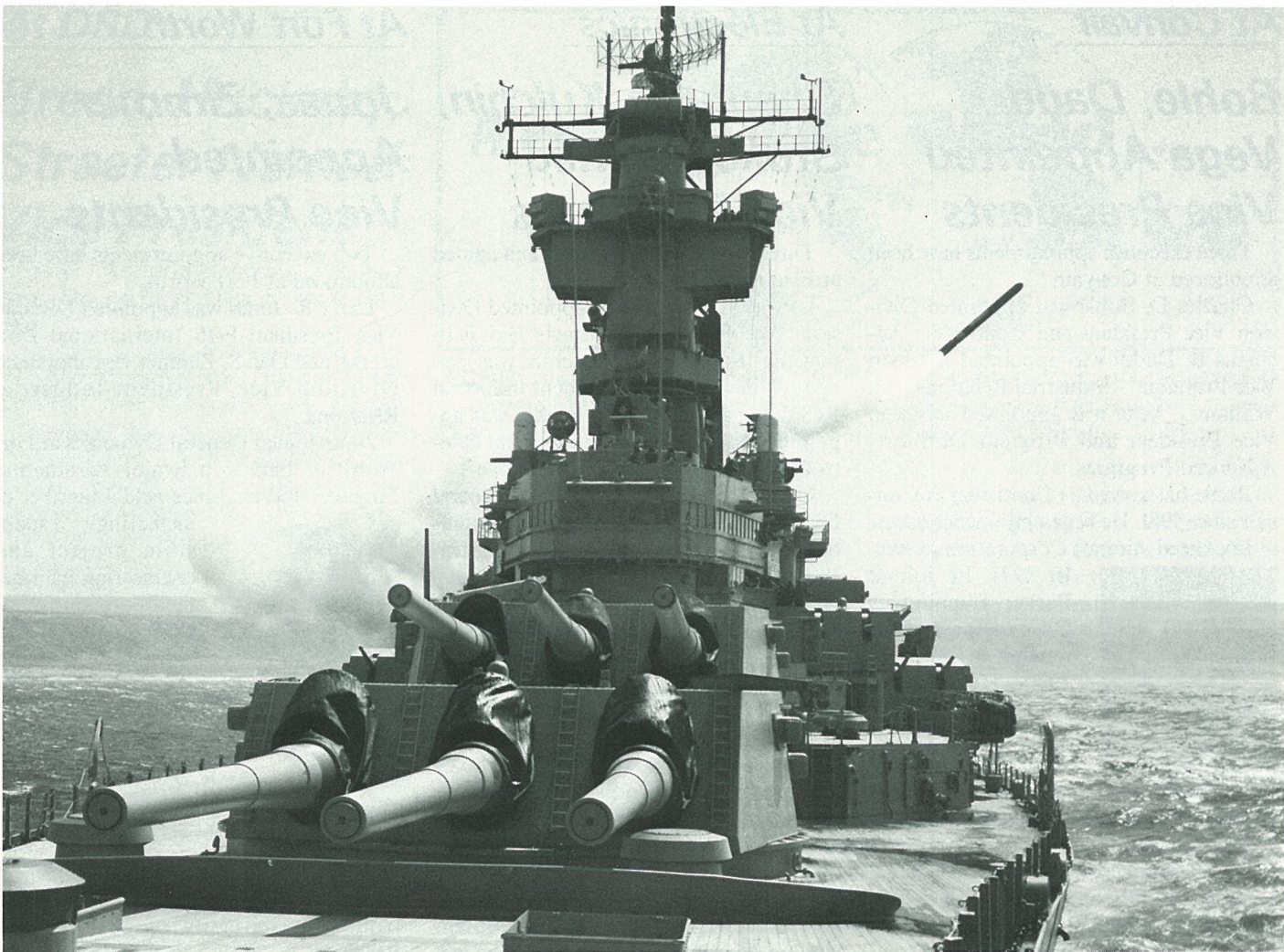
## U.S. Navy, Quincy Sign Final T-AKX Ship Agreement

Final agreements between the U.S. Navy Military Sealift Command and Quincy Shipbuilding for the construction and charter of five T-AKX Maritime Prepositioning Ships at a cost of \$775 million were signed in May. Quincy was selected to build the ships late last year.

Vice Adm. Kent J. Carroll, Commander of the Military Sealift Command, signed agreements to charter the ships for five years, with four options of five years each for a total of 25 years per ship.

According to the Navy, the five Quincy ships are the first oceangoing commercial cargo ships to be ordered from U.S. shipyards since December 1981.

The mission of the ships is to support the nation's Rapid Deployment Force by being prepositioned in areas of the world where trouble may be anticipated. The T-AKX ships will have roll-on, roll-off capability and each of the 671-foot-long, 22,700-ton vessels will have the capacity to transport and store the vehicles, ammunition, rations, fuel and other materials required by a force of 3,000 Marines.



The First Tomahawk Test Flight from the USS New Jersey

## Battleship USS New Jersey Launches Tomahawk

A U.S. Navy/Convair Tomahawk Sea Launched Cruise Missile has been successfully launched from the battleship USS New Jersey (BB 62) under way off the California coast.

The test marked the first launch of a Tomahawk cruise missile from the recommissioned battleship. The Tomahawk was fired from one of eight armored box launchers aboard the ship, each capable of launching four cruise missiles.

Powered by its turbofan cruise engine,

the Tomahawk flew a fully-guided simulated land-attack mission of approximately 500 miles to a target area at the Tonopah Test Range, Nevada.

The missile was steered to the target area by its terrain matching guidance set. Once inside the desert range, a digital scene-matching system which provides precise terminal guidance for land-attack missions, zeroed the Tomahawk in on the target.

The test was another in a series of de-

velopmental/operational tests being conducted from surface ships at the Pacific Missile Test Center's Sea Test Range.

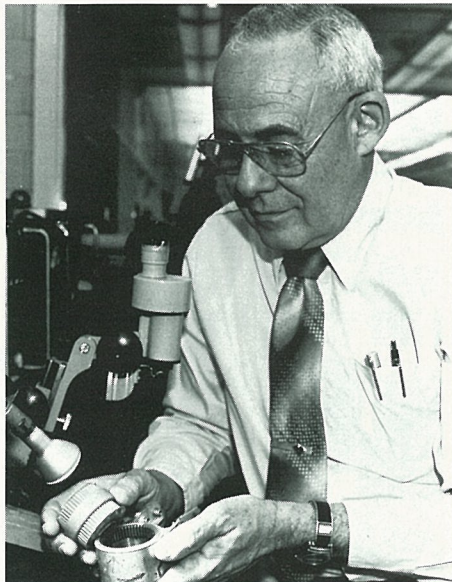
Convair is producing Tomahawk cruise missiles for the Navy and the Air Force and developing a Medium Range Air-to-Surface Missile for joint service use. Tomahawks are planned for deployment on over 100 Navy destroyers, cruisers, battleships and attack submarines and in Air Force mobile ground launchers to be based in Europe.

## Fort Worth Improves Nondestructive Testing

When inspectors at Fort Worth needed a way to detect defects in hard-to-see surfaces, such as the insides of bolt holes, Materials Technology engineers developed an innovative nondestructive inspection method called magnetic rubber inspection.

The MRI technique proved to be a breakthrough and is now used at Fort Worth in the inspection of selected F-16 and F-111 components and at Convair in the inspection of missile parts. It also is being used by other industries, the U.S. Air Force and U.S. Army.

"Magnetic rubber inspection combines the principles of magnetic particle inspection, a technique that has been around for a long time, with a novel replicating system," said Bill Kaarlela, one of the engineers who worked on the project. "In both MRI and magnetic particle inspection, the part to be examined is magnetized briefly while magnetic particles are applied to its surface. The particles are drawn to cracks because of breaks in the magnetic field."



Exact Inspection. Engineering Specialist Henry Weltman removes a magnetic rubber inspection "replica" from an F-16 flap actuator gear in Fort Worth's Materials Technology Laboratory.

That is, a crack in a part forms a gap sided by two poles, thus creating an area of stronger magnetism.

Kaarlela explained how MRI differs from magnetic particle inspection: "In magnetic particle inspection, the surface to be tested is flooded with particles dispersed in kerosene. The part is then inspected visually for regions of particle concentration.

"In MRI, the particles are dispersed in a liquid rubber formulation that is applied to the test surface. After magnetization, when the particles are concentrated where cracks are present, a solidifying catalyst is added to the rubber concentration."

The rubber is then allowed to cure. After curing, the solid replica casting can be removed and examined for the presence of vivid dark lines — made by the magnetic particles — which reveal the locations of cracks in the part surface.

"This is the chief advantage of MRI — our being able to remove the casting from the part surface, which is often in an inaccessible area, so that the examination can be made under optimum conditions. In most cases, the replicas are examined with a magnifying glass or low power microscope so that even tiny irregularities can be seen," Kaarlela said.

The MRI procedure is in wide use, but a minor difficulty has been that the original liquid rubber product required about an hour to solidify after the catalyst was added. The engineers have now discovered that certain chemical changes in the prod-

uct and use of a different catalyst result in a faster curing time. In some cases, the material can be solidified in as short a time as 10 minutes.

"The faster cure makes MRI convenient for use with a wider variety of ferrous parts," explained Henry Weltman, another worker on the MRI project. "Also, the product that was originally used solidified to form a gray specimen. Newer generations of the product form a yellow specimen, which further increases the magnetic particles' visibility."

## Fort Worth Wins Air Force Award

Continued from Page 1

The VECP program provides government contractors with incentives to reduce the life-cycle costs of their products. The contractor shares in the benefits of a VECP through a specified increase in earnings that is based on the amount saved.

A VECP award similar to the one given to Fort Worth was presented to Brig. Gen. George L. Monahan, Jr., F-16 Systems Program Office Commander.

## On Leave to NASA

Dr. Frank X. Hurley, Manager of Research and Technology at Fort Worth since 1977, has been granted a year's leave of absence to serve as Deputy Chief Scientist of the National Aeronautics and Space Administration.

## Savings and Stock Investment Values

	Mar. 1981	Mar. 1982	Mar. 1983
<b>Salaried</b>			
Government Bonds	\$ 2.5835	\$ 2.8632	\$ 3.4401
Diversified Portfolio	2.1869	1.9218	2.9224
Fixed Income	1.1850	1.3183	1.4725
<b>Hourly</b>			
Government Bonds	2.5811	2.8598	3.4375
Diversified Portfolio	2.2351	1.9617	2.9843
GD Stock	\$33.5000	\$24.1250	\$43.2500



## Pomona Marks SM-1 Block VI Achievement

Pomona has produced its 1000th Standard Missile-1 Block VI for the U.S. Navy. Block VI missiles contain numerous improvements over earlier versions of Standard Missile.

At ceremonies celebrating the production achievement, Rear Adm. Wayne E. Meyer, Navy Aegis Shipbuilding Project Manager, Naval Sea Systems Command, Washington D.C., congratulated employees for their efforts.

The key element of Standard Missile-1 Block VI is a guidance section incorporating a new monopulse receiver, signal processor and digital guidance computer.

Standard Missile is an all-electric, supersonic, surface-to-air missile that is the primary anti-air defense system for nearly 100 U.S. Navy combat ships and 29 ships of foreign navies.

Significant improvements in performance and electronic counter-countermeasures capability have been developed by Pomona engineers since production of the first Standard Missile took place in the mid-1960s.

The changes have been introduced in a series of evolutionary improvements that ensure that the performance of the Standard Missile family remains ahead of threats to the U.S. fleet and allied navies.

Standard Missile-1 became the U.S. Navy's major surface-to-air weapon system in the late 1960s, and since then, thousands have been produced and delivered to the U.S. and foreign navies.

Initial production of Standard Missile-1 Block VI guidance sections was completed in 1981, and Pomona has received three additional contracts totaling \$254 million for the production of guidance control and airframe sections and spare parts.

Two Standard Missile-1 Block VI missiles were fired late last year from the U.S. Navy's newest guided missile cruiser, USS *Ticonderoga*.

## Sale of 75 F-16s To Israel Proposed

The Department of Defense has notified Congress of a proposed Letter of Offer to the government of Israel for the sale of 75 additional F-16 fighter aircraft.

The offer includes associated support equipment, depot level repair capability, test equipment, software support, future releasable engineering changes and spares for Israel's entire F-16 fleet. Including training and costs associated with potential coproduction, the offer has an estimated cost of \$2.7 billion.

The proposed sale is consistent with United States policy of insuring that Israel has the means to defend itself within secure borders.

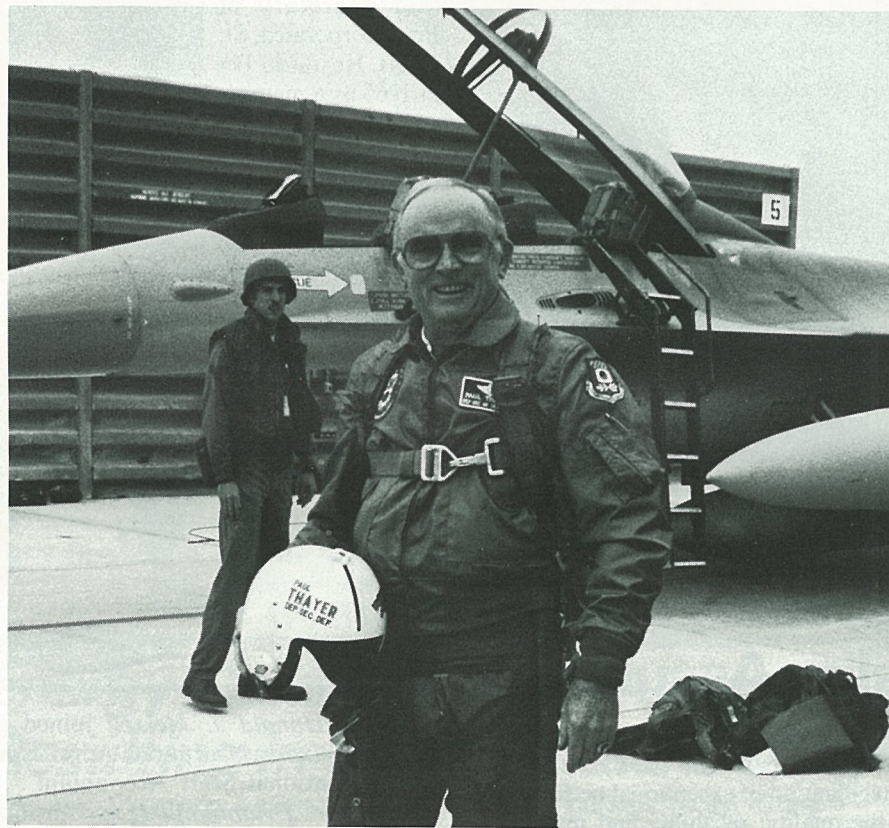
# GD World

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June 1983

## Deputy Secretary of Defense Pilots F-16



**Ace High.** During a recent trip to the Far East, Deputy Secretary of Defense Paul Thayer piloted an F-16 from the front seat on a two-hour flight from Kunsan AB, South Korea, to Misawa AB, Japan. Thayer became a fighter ace in World War II while flying in the U.S. Navy. Following his flight in the F-16 assigned to the 8th Tactical Fighter Wing's famed "Wolf Pack," the Secretary said, "It performed very well; I was extremely pleased with the flight. It gave a fighter pilot the feeling he is really in a very high-performance airplane in air-to-air combat or in any mission that it would be called upon to do." He began a 35-year business career as an engineering test pilot with Chance Vought Corp. and was Chairman of the Board and Chief Executive Officer of LTV Corp. for 12 years before being selected by the President for his present assignment.

## Sen. Hawkins Calls USS Florida "Vital Force" for Preserving Peace

With crew members in dress whites lining her deck, the nation's third Trident missile-firing submarine, USS *Florida* (SSBN 728), formally joined the fleet June 18th during commissioning ceremonies at Electric Boat's Groton, Conn., shipyard.

Addressing the 2,500 guests gathered at Electric Boat's Pier E, U.S. Senator Paula Hawkins, Republican of Florida and principal speaker at the event, called the 560-foot, 18,750-ton vessel "a vital force for the preservation of peace and the American way of life."

"American submarines," Senator Hawkins went on, "have long been known for their technological sophistication, and the Trident program carries on that impressive tradition. The result is a significant

increase in the effectiveness of our sea-based ballistic missile forces, enhancing an already potent force for peace."

Hawkins, the daughter of a career Navy man, said she wanted all military personnel to know how much their work is appreciated: "I know what sacrifices are necessary, and I know of the real impact that these sacrifices have on individuals and their families."

In brief remarks, Florida Governor Bob Graham called the submarine "an ultimate instrument of foreign policy. In every port it visits, this submarine serves notice that America wants peace. America is strong — strong in technology, strong in resolve and strong in the security our military provides."

## 2 Tomahawks Score Successes In June Tests

Convair Tomahawk cruise missiles flew a pair of successful test missions in early June.

On June 3rd, a U.S. Navy Tomahawk was launched from the submerged attack submarine USS *La Jolla* off the California coast and flew more than 800 miles to the target area on the Utah Test and Training Range. The missile was recovered by parachute after passing over a simulated target and returned to Convair for refurbishment and reuse in the test program.

On June 7th, the U.S. Air Force carried out a successful mission in its series of operational test and evaluation flights of the Tomahawk Ground Launched Cruise Missile.

The GLCM was fired from its transporter-erector-launcher at the Utah Test and Training Range. After boost and transition to cruise flight, the missile used its low-altitude terrain-following capabilities to fly a fully-guided mission to a simulated target on the range. All test objectives were met in demonstrating the GLCM's weapon system capability.

\* \* \*

## Convair Increases Production Rate Of Cruise Missiles

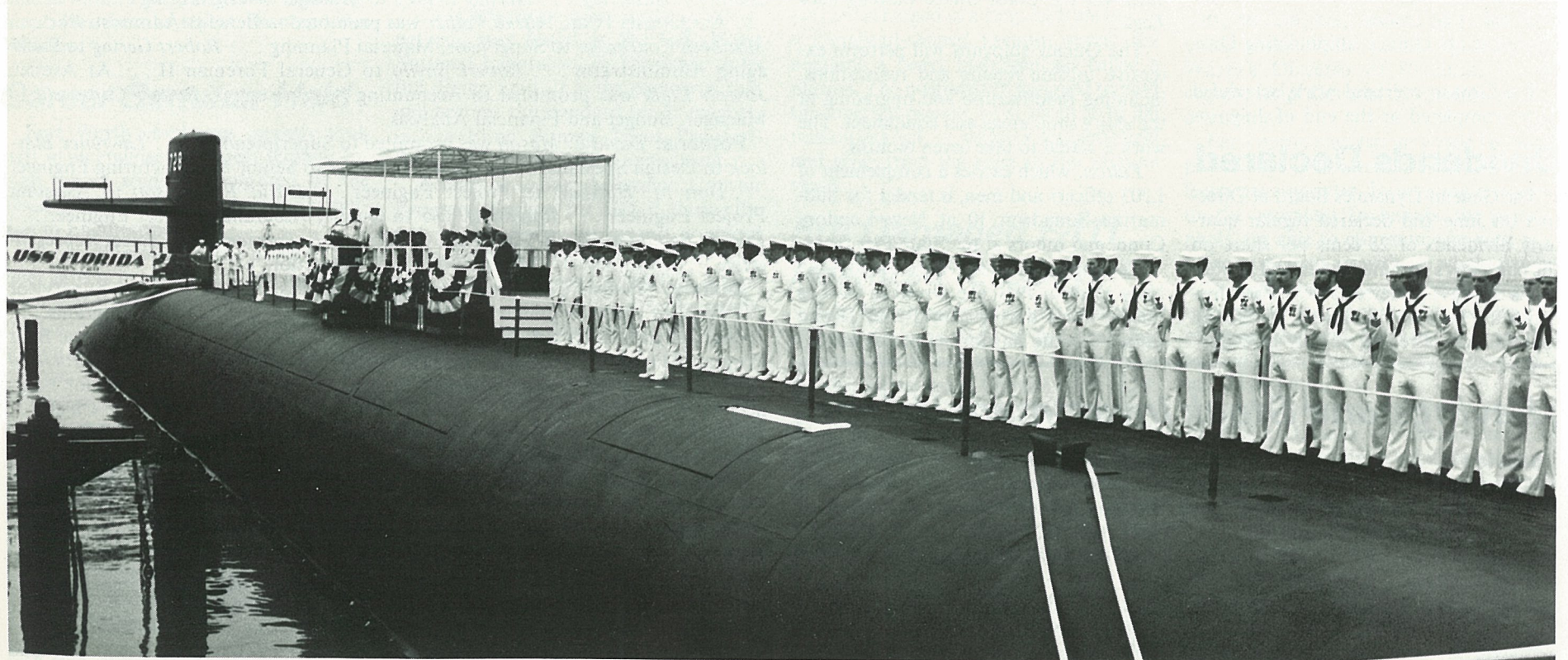
Production of Convair's Tomahawk cruise missile increased in April and May, when 22 missiles were delivered to the Department of Defense, according to B. J. Wier, Convair Program Director of Cruise Missile Production.

In April, Convair marked a production milestone by the delivery of 12 missiles, the largest monthly total yet achieved. This was followed by delivery of 10 missiles in May. June's schedule calls for delivery of another 10 missiles.

Eleven of the missiles were production Ground Launched Cruise Missiles — five delivered in April and six in May, putting the company two ahead of the contract delivery requirement.

Six missiles were production Sea Launched Cruise Missiles, four of which were delivered in April for installation on the recommissioned battleship USS *New Jersey*. Two additional land-attack SLCMs were delivered in May.

In addition to these production missiles, Wier said Convair also delivered four flight test missiles to the USS *La Jolla*, three of which have already made their flights. Another flight test missile has been delivered to Point Mugu, Calif., for a vertical launch system test.



The Commissioning of the USS Florida





**EB Award.** W. J. Willoughby Jr. (left), Deputy Chief of Naval Material, presents the Reliability, Maintainability and Quality Assurance Award to Fritz G. Tovar, who accepted the honor in behalf of the men and women at Electric Boat.

## Tovar Receives U.S. Navy Award For Reliability, Quality Assurance

The U.S. Navy's award for Reliability, Maintainability and Quality Assurance was presented in May to Fritz G. Tovar, Vice President-General Manager of Electric Boat.

W. J. Willoughby Jr., Deputy Chief of Naval Material for Reliability, Maintainability and Quality Assurance, accorded the 1983 honor to Tovar for his "outstanding contribution to fleet readiness."

Tovar was cited "in recognition of his dedicated commitment to the achievement of reliable naval material through design engineering excellence, error-free manufacturing and maintenance simplicity."

"I accept this award in the name of the men and women of Electric Boat," Tovar said. "We have started a new concept of building submarines, and I believe by going into packaging and preoutfitting, we can build ships more economically, with greater precision and with higher quality."

"I appreciate being given this award, and it will be an incentive to do even more to build better ships for the Navy," he said.

Tovar has been General Manager of Electric Boat since 1981. The division produces the Navy's Trident ballistic missile submarines and SSN 688-class attack submarines.

Recipients of the award are nominated by their companies, at the Navy's request, in recognition of exceptional performance in the quality, reliability and maintainability areas.

General Dynamics President Oliver C. Boileau said Tovar was nominated for "having personally directed improvements in installation processes and workmanship quality which, in addition to achieving labor productivity gains of up to 20 percent, resulted in the early delivery of two submarines in 1982." Another two submarines have been delivered ahead of schedule thus far in 1983.

From 1977 to 1979, Tovar was General Manager of Electric Boat's manufacturing facility at Quonset Point, R.I. There he directed the design, development, construction and activation of a new facility for the fabrication of submarine hull frames and cylinders.

Boileau said Tovar's nomination was "symbolic of the entire U.S. Navy/Electric Boat team's commitment to reliability, maintainability and quality assurance, a commitment which has resulted in a significant contribution to the timely realization of the Navy's submarine force levels."

## USS Fulton at EB Dry Dock for Overhaul

Submarine designers and builders at Electric Boat's Groton, Conn., shipyard are getting accustomed to an unusual sight these days — a surface ship high and dry in Graving Dock No. 2.

The 530-foot, 9,250-ton USS *Fulton* (AS 11), a submarine tender, entered the dock recently for the first part of a major overhaul. The second part will be performed at the Quincy Shipbuilding Division.

The Groton overhaul work, scheduled to be completed at the end of July, includes sand blasting and painting the hull, changing the ship's shafts and propellers, refurbishing the tanks and steering system and several nuclear ship alterations.

The *Fulton* is the first surface ship to be serviced at EB in nearly a decade. The last surface vessel worked on at the shipyard was the Coast Guard training bark *Eagle*.

The Quincy shipyard will perform extensive topside repairs and renovations, including modification and upgrading of the ship's shop areas and equipment. The work is slated to take seven months.

*Fulton*, which carries a complement of 1,303 officers and men, is tender for Submarine Squadron 10 at New London, Conn., and moors at the State Pier there. Commissioned at the Mare Island, Cal., Navy Yard in 1941, she served in various Pacific areas during World War II and earned a battle star for her performance.

The General Dynamics Board of Directors on June 2nd declared regular quarterly dividends of 25 cents per share on the company's common stock and \$1.0625 on its Series A preferred stock. Both dividends are payable on August 15, 1983 to shareholders of record on July 15, 1983.

## Savings and Stock Investment Values

Salaried	Apr. 1981	Apr. 1982	Apr. 1983
Government Bonds	\$ 2.5671	\$ 2.9173	\$ 3.5110
Diversified Portfolio	2.1570	2.0116	3.1392
Fixed Income	1.1954	1.3292	1.4862
Hourly			
Government Bonds	2.5647	2.9171	3.5090
Diversified Portfolio	2.2049	2.0431	3.2074
GD Stock	\$34.0000	\$28.6481	\$50.3750

## Duesenberg Named Staff Vice President

Robert H. Duesenberg has joined General Dynamics as Staff Vice President and Deputy General Counsel of the Corporation.

Duesenberg, 52, has been serving as Vice President, General Counsel and Assistant Secretary of Pet Incorporated, St. Louis. He joined Pet in 1965 as a member of the company's legal staff, and, after serving in positions of increasing responsibility, was appointed to his most recent post in 1980.

Prior to joining Pet, he was associated with the Wabash Railroad as an attorney

from 1958 to 1964 and as a general attorney in 1964-1965 with the Norfolk and Western Railway Company, into which the Wabash Railroad was merged.

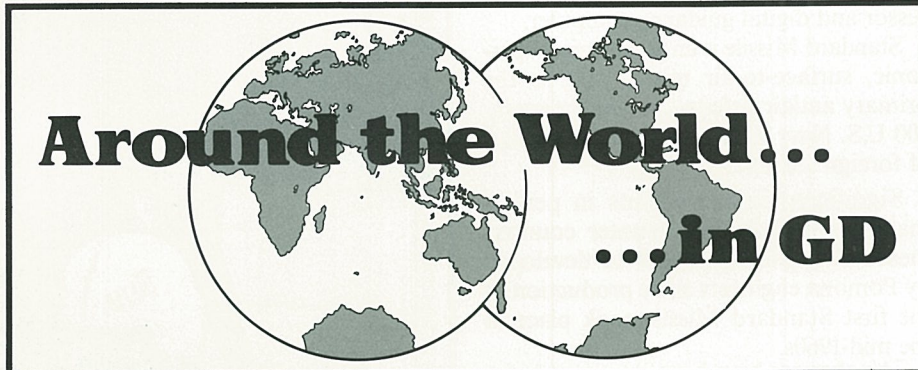
A native of St. Louis, Duesenberg was graduated from Valparaiso (Ind.) University in 1951 with a Bachelor of Arts degree and was awarded a law degree from Valparaiso University Law School in 1953. In 1956, he was graduated from Harvard University Law School with a master's degree.

From 1953 to 1955, he served with the U.S. Army assigned to the Judge Advocate office in Heidelberg, West Germany.

Duesenberg is a member of the Missouri, St. Louis and American Bar Associations and has held a number of important committee posts with those organizations.



**Duesenberg**



**CHQ:** Donald J. Meixell joined as Administrative Financial Specialist . . . R. Kent Nixon as Corporate Administrator, Directive Systems . . . Nancy A. Porter as International Staff Accountant . . . Frank A. Riedl as Internal Auditor . . . Richard V. Drummond II as Corporate Manager, EM/OS Network Communications . . . Mary F. Cook as Corporate Manager, EM/OS Human Factors . . . Conrad E. Jimenez as Subcontract Auditor . . . Henry J. Sechler as Corporate Director, International Operations-Washington . . . Anthony Germano as Senior Auditor . . . John C. Palazzolo as Security Administrator . . . Marsha L. Cmunt was promoted to Corporate Manager-Capital Analysis and Resources Financial Planning . . . Cynthia A. Croft to Government Contracts Settlement Specialist . . . Janet K. Meyer to Employee Benefit Accounting Supervisor . . . Tommye R. Rogers from Payroll & Benefits Accounting Manager . . . Norman G. Ingham transferred from Electric Boat and was promoted to Corporate Contract Specialist . . . Donald E. Harris transferred from Fort Worth and was promoted to Manager-Corporate Site Operations, EM/OS Program.

**Fort Worth:** W. W. Akins, B. G. Burt and A. B. Phillips were promoted to Tool Design Supervisor . . . E. L. Bensen to Quality Assurance Engineer Specialist . . . J. A. Broesche and J. R. Chambers to Purchasing Agent . . . C. Burch Jr. to Logistics Contract Representative . . . K. C. Clark to Engineering Specialist . . . F. O. Fernandez and A. L. Hollis to General Foreman . . . J. R. Hix to Engineering Group Supervisor . . . J. D. Huckabee to Chief of Procurement . . . J. L. Hurst to Project Tool Engineer . . . C. E. Ince III to Production Management Specialist . . . F. Jesmain to Industrial Engineering Supervisor . . . E. C. Johnson to Chief of Manufacturing Control . . . R. L. Kragle to Program Specialist . . . J. F. Krajca to Senior Manufacturing Technology Engineering Specialist . . . P. J. Laurence and R. R. Wright II to Project Manager . . . H. F. Mares Jr. to Manufacturing Technology Supervisor . . . L. McDarty to Project Coordinator . . . M. M. Nelson and R. E. Parker to Superintendent . . . J. M. Phillips to Assistant Project Engineer . . . E. M. Pickett to Engineer . . . G. C. Stone and G. F. Van-Y to Senior Manufacturing Technology Specialist . . . D. E. Thompson to Field Service Engineer . . . E. S. Turan to Chief, Quality Assurance . . . J. P. Unkart and J. R. Wickizer to Manufacturing Control Supervisor . . . L. M. Wheeler to Planning Specialist . . . C. D. White to Field Operations Manager . . . E. A. Wilson to Foreman . . . D. B. Young to Senior Quality Assurance Engineer . . . R. W. Newhouse to Manager of Production and Quality Improvement Program.

**Electric Boat:** Joel Adams, Kevin Poitras and Thomas Skrmetti were promoted to Assistant Chief Nuclear Test Engineer . . . Harold Calkins and John Rondina to General Foreman . . . Danny Dailey and Darrell Fujiyoshi to Nuclear Test Supervisor . . . Carl Larson to Director of Nuclear Engineering . . . Donald Schaffer to Supervisor, Nuclear Quality Control Engineering . . . Robert Scheel to Supervisor, Quality Engineering . . . Harold Druery to Manager of Engineering . . . At Quonset Point, Alfred Vallier was promoted to Benefits Administrator . . . Maribeth Cournoyer to Supervisor, Material Planning . . . Robert Gering to Packaging Administrator . . . Robert Savini to General Foreman II . . . At Avenel, Joseph Kulik was promoted to Accounting Supervisor . . . Robert Comprelli to Manager, Budget and Financial Analysis.

**Pomona:** David C. Mason was promoted to Superintendent . . . Lawrence Blaylock to Design Specialist . . . Charles E. Frazier to Senior Manufacturing Engineer . . . Don M. Hinshaw to Project Engineer . . . David R. Hudson to Assistant Project Engineer . . . Ronald D. Orr to Quality Assurance Project Engineer . . . Luis E. Padilla to Group Engineer . . . Michael L. Parmenter to Project Representative . . . Matthew W. Raymond to Chief, Inspection.

**Quincy:** Michael Cullivan was promoted to Production Support Supervisor . . . Stephen Grief to Quality Assurance Supervisor-Electric Boat Programs . . . Richard Brown to Deputy Program Manager . . . Robert Dluhos to Electric Boat Program Manager . . . Douglas Rand to Quality Assurance Supervisor . . . Richard Jafferian to Special Project Manager-Fulton . . . Rodney Rupert to Senior Engineering Supervisor-Nuclear . . . Fred Stafford to Program Planning Chief . . . Richard Kubecka to Facility and Maintenance Administrator . . . Paul Lovely, Albert Rockwood and Edward Dupere to Engineering Services Supervisor-Planning . . . Harold Briete to Engineering Supervisor . . . Rod Nussbaum to Manager of Systems and Procedures.

**Electronics:** Paul Burksaze was promoted to Engineering Specialist . . . Darlene Carr and Ralph Vernor to Technical Supervisor . . . Robert Dewey and Steve Parent to Project Manager-Operations . . . Don Haysahigawa to Senior Engineer . . . Nancy Meekins to Industrial Relations Representative.

**GDSC:** R. L. Trueblood was promoted to Senior Logistics/Specialist.

**DSD:** Stephen D. Ide transferred from Eastern Center to St. Louis and was promoted to Technical Buyer.



## William L. Godsey Appointed Pomona VP-International

William L. Godsey has been appointed Division Vice President-International at Pomona. Godsey has been serving as Corporate Director-Europe for the company since 1980, with offices in Brussels, Belgium. He joined General Dynamics in 1956 at Fort Worth as a Senior Aeronautical Systems Engineer and, in 1966, was assigned as Field Representative in the company's Dayton, Ohio, office.

Godsey later held increasingly responsible engineering and management positions in the Washington, D.C., office and in the company's corporate office in St. Louis. Prior to his assignment in Europe, he served as Corporate Director-Eastern Region Government Relations in the Dayton office.

Godsey was awarded a Bachelor of Science degree in Electrical Engineering in 1956 from the University of Tennessee and holds a Certificate in National Security Management from the Industrial College of the Armed Forces.

## 600 Attend Dinner For Achievements In Cost Reduction

Seven persons were honored for outstanding achievements in Cost Reduction and Quality at the annual Awards Night in Fort Worth on May 12th.

Named Cost Reduction winners were: T. E. Henderson, representing the Research and Engineering departments; O. B. Moberly, Manufacturing and Support; M. B. Busby, Material, and R. E. Cherry Jr., Administrative and Service departments. Each was awarded a plaque and \$1,000 by Herbert F. Rogers, Vice President and General Manager.

The Individual Quality Award plaque and \$1,000 were given to T. C. Mechalske, who works in the F-16 and F-111 Kits and Spares department. The departmental Quality Award winner was M. L. Westcott, who works in the Wing and Canopy area.

The M. J. Scott Memorial Award, given annually to the department head who has done the most to stimulate interest in Suggestion Program participation, went to J. E. Mayben, Director of Product Assurance.

Nearly 600 persons attended the dinner. Two hundred and twenty-seven candidates for the Cost Reduction Awards produced a savings at the division in excess of \$220 million for the year.

Rogers also presented Diamond Pin Awards to 25 employees whose savings suggestions each totalled more than \$1 million within a one-year period and recognized 42 others as repeat Diamond Pin Winners.

## Career Seminar Held

Fort Worth employees recently took part in an engineering career seminar for high school students sponsored by the Texas and Fort Worth Alliance for Minorities in Engineering.

About 380 students were urged to consider careers in engineering and computer science at the seminar which was held at the General Dynamics Recreation Association. Fort Worth is an active corporate member in the Fort Worth Alliance for Minorities in Engineering.

# GD World

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G. Alexander Smith



**Cadet Inspection.** An M1 Abrams tank receives a close inspection by cadets and faculty members at the U.S. Military Academy at West Point, N.Y. The tank was part of a display of modern military equipment set up at the academy in conjunction with a recent regional meeting of the Association of the U.S. Army.

## Energy Conservation Measures Resulting in More Efficient Usage

An extensive energy conservation program throughout the corporation has been showing significant effects year after year and has resulted in a 45 percent improvement in energy efficiency over the past seven years.

This continuing success was reported by Richard Norton, Corporate Manager of Fire Protection and Energy Conservation Programs, at a meeting of company energy coordinators held recently at Convair.

Norton said that General Dynamics' energy consumption was reduced more than 4.25 trillion BTUs between 1975 and 1982, although the 1982 figure contained the total of 1.5 trillion BTUs used by Land Systems which became part of the company in March 1982.

A comparison was made, however, in the number of BTUs used per employee manhour, "which went from 210,817 in 1975 to 115,552 in 1982," Norton said. "This is a 45 percent improvement in energy efficiency."

Norton emphasized that the energy conservation in the seven-year period "is particularly significant considering that the corporation's sales have more than

tripled in the same period of time."

One of the most notable energy saving measures being taken by the company, he said, is the operation of computerized energy management systems, which control heating, lighting, air conditioning, pump operation and other energy uses. The energy management systems also provide an important maintenance tool necessary to find improperly operating systems.

Norton said that considerable savings also have been made through the use of more energy-efficient lighting, improved insulation and the turning off of equipment when not in use.

Norton also told the coordinators that, despite their successful energy saving efforts at their divisions and subsidiaries, energy costs for the corporation have risen because of rapidly escalating unit price costs.

Norton told the coordinators that it was vital that energy usage be kept down in the future because of these mounting costs. He urged them and all General Dynamics employees to continue to develop energy-saving ideas and to intensify their efforts in eliminating unnecessary energy consumption.

## Convair Magnet Coil Prototype Completes Key Test at Oak Ridge

A prototype magnet coil designed and built by Convair for a Department of Energy experiment to study controlled nuclear fusion has been successfully tested.

The 1,000-pound superconducting magnet coil was tested at the Oak Ridge National Laboratory in Tennessee to its full design limit. It is the prototype that will become the standard for 36 magnets in the Elmo Bumpy Torus Proof-of-Principle (EBT-P) fusion experiment.

According to Sam Ackerman, Convair Program Manager for EBT-P, during the tests at Oak Ridge, the magnet produced magnetic fields 50 percent higher than called for in the current EBT-P design. "These tests," he said, "represent a significant milestone in development of practical fusion power reactors."

The coil for the magnet was delivered by Convair earlier this year. When initial testing is complete, it will be returned to San Diego where it will be assembled into its final configuration prior to shipment back to Oak Ridge.

Ackerman says the spool-shaped winding will be completed by welding a stainless steel ring around it, and installing it in a vacuum-tight housing which will thermally insulate the magnet for operation in a liquid helium environment at minus 450 degrees Fahrenheit.

The completed magnet is about three feet in diameter, weighs over 2,000 pounds and is wound with niobium-titanium superconductor. In the EBT-P design, 36 magnets are arranged in a ring, each encircling a doughnut-shaped vacuum vessel that contains a heavy hydrogen gas called a plasma. The magnets are designed to hold the superhot plasma — at about 50 to 100 million degrees — within a magnetic field and away from the sides of the vacuum vessel.

## 6th Damaged F-111 Restored to Duty

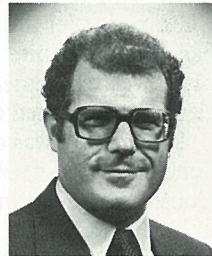
Fort Worth completed restoration of another damaged F-111 in late May and returned the aircraft to the U.S. Air Force for operational use at Cannon AFB, N.M.

Aircraft No. 68-136, an F-111D, was received by Fort Worth in June of 1981 with extensive damage that had resulted from an in-flight engine fire. Affected areas included the right-hand empennage, aft fuselage, wing flap and engine housing, said Jerry Parris, Program Manager for F-111 Restoration.

This aircraft was the sixth F-111 that has been restored at Fort Worth to date and the fifth under the current restoration contract, Parris said.

## Straeter Named Tactical Systems Vice President

Dr. Terry A. Straeter has been appointed Vice President and Programs Director — Tactical Systems for Electronics Division. He was previously Vice President and Director of the Western Center of Data Systems Division.



*Straeter*

Before joining General Dynamics in March 1979, Straeter held a series of technical and supervisory positions at NASA's Langley Research Center in Hampton, Va. During that time, he was also an adjunct faculty member at George Washington University, the College of William and Mary, and Christopher Newport College.

Dr. Straeter holds a Bachelor of Arts degree in Mathematics from William Jewell College, a Master of Arts degree in Mathematics from the College of William & Mary, and his doctorate in applied mathematics from North Carolina State University.

## Computer Network To Link Members Of Quality Panel

General Dynamics is cosponsoring a nationwide computer teleconference on Quality to help develop recommendations for a White House Conference on Productivity that will be held next fall.

The teleconference has more than 20 participants from major industries and universities. Willie C. Livingston, Fort Worth's Director of Productivity, is representing General Dynamics in the discussions.

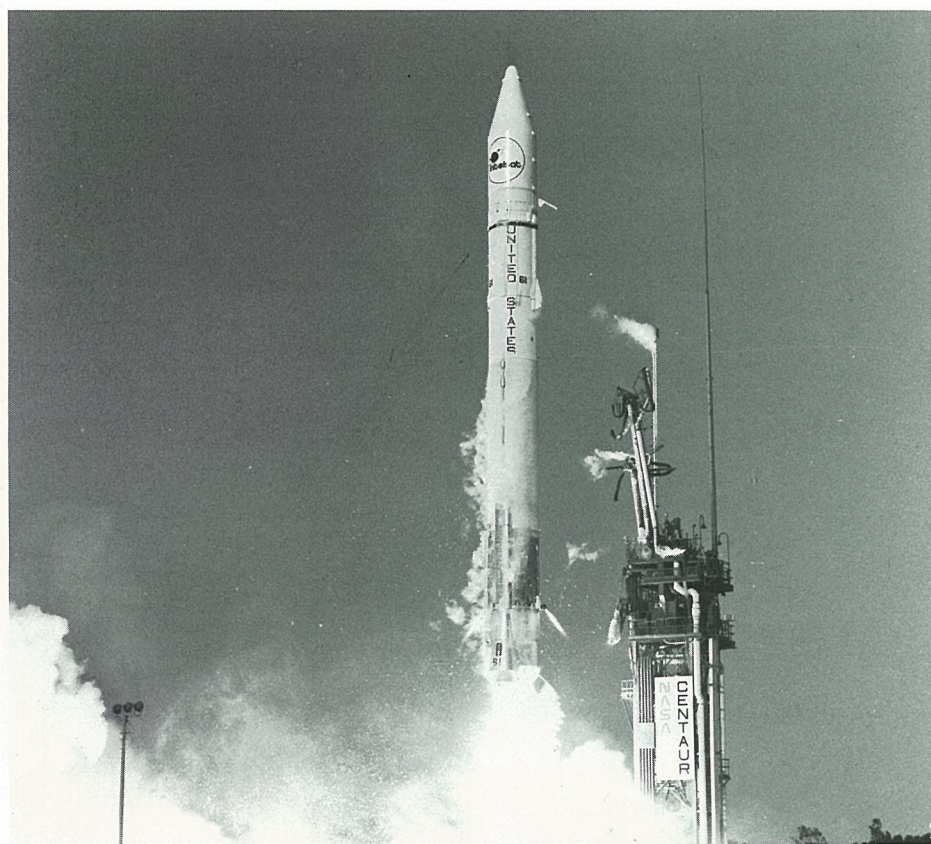
Each participant has an Apple IIe computer which links him to a central teleconferencing computer. By entering messages on the computer keyboards, the participants are able to communicate with any other participant or with the whole group.

"I think the teleconference is a great opportunity for the company, because our participation will help us stay on the leading edge of productivity technology," said Livingston.

Besides being a forum for the sharing of ideas on Quality, the teleconference is expected to provide new information on how computers can be used to link people and organizations.

The Quality discussion is one of seven teleconferences being coordinated by the American Productivity Center in preparation for the White House Conference. A summary of the points covered in each of the teleconferences is to be prepared after the discussions end in July.





**All Systems Go.** An Atlas/Centaur successfully launches the sixth Intelsat V satellite from Cape Canaveral, Fla., on May 19th. Intelsat V is the largest and highest capacity commercial communications spacecraft built to date and can relay 12,000 two-way telephone calls and two color TV channels simultaneously.

## Fort Worth's Productivity Gains Win Citation from Air Force

The U.S. Air Force has recognized Fort Worth's Productivity Improvement Program with a Productivity Achievement Citation. Under the program, the division has made definite gains toward initial objectives of greater manufacturing efficiency and reduced costs.

The citation was accepted by D. Blaine Scheideman, Fort Worth Vice President-Contracts and Estimating, at a conference in Denver, Colo.

"Productivity gains are accomplished at the division level chiefly through the efforts of functional departments. This award is the result of a concerted effort by all Fort Worth personnel," said Willie C. Livingston, Fort Worth Director of Productivity.

### Focus in Offices

While earlier phases of the division's productivity program have focused on opportunities for improvement that involve production, the Productivity Plan for the immediate future calls for increased attention to the many office workers and other personnel who support production, but who rarely come in direct contact with the division's current major product, the F-16.

Fort Worth's first Productivity Plan was established after initiation of the Corporate Productivity Improvement Program in 1981. Productivity advances in the Production Department actually began in the mid-1970s through such programs as Technology Modernization.

"I think this division is doing an outstanding job of accepting the challenge that was offered by the Corporate Productivity Improvement Program," said Livingston. "Productivity measurements for 1982 show that the division met or exceeded all the goals established for the year."

### \$64 Million Saved

Capital investments made for plant modernization resulted in savings of \$64 million in F-16 production costs through 1982. At the same time, statistical evaluations of the F-16 program indicate there has been a continuing "learning curve" reduction in the number of man-hours required to produce each aircraft as the program has progressed.

"In most other production programs, the learning curve levels off after about the first 500 items produced. Fort Worth has already produced nearly 700 quality F-16s, and the trend of reduced man-hours is still evident," said Livingston.

"The major objective for 1983 is for the division to become involved with the technologies that can improve the productivity of our office personnel," he added.

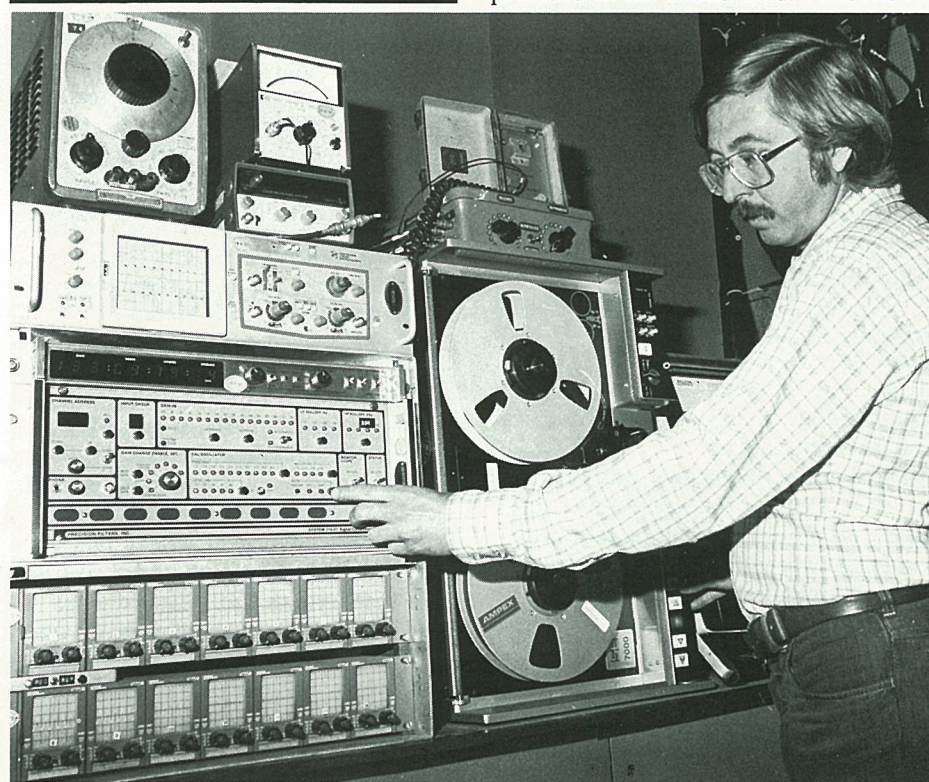
"Productivity improvements in this area are now being planned. Increased office automation will be a major element, but other considerations will involve management style, organizational approaches and quality issues. Quality must be an overall approach to doing business," explained Livingston.

### Future Projects Outlined

Three productivity improvement projects for the near future are the Electrical Harness Data System (EHDS), Computer-Aided Retrieval and Distribution System (CARDS) and Technical Publications Production Automation Project.

The EHDS will streamline the flow of data that supports electrical harness production. The new system will employ computer terminals to eliminate much of the paperwork now associated with the data flow. Similarly, the CARDS is expected to reduce the time and number of steps involved in routing engineering documents through division channels. The technical publications project will automate many of the steps that are required to produce Technical Orders and other documents.

"An annual savings of \$2.5 million is projected with the EHDS, and a savings of \$4 million is projected with the CARDS," said Livingston. "Both systems are expected to pay for themselves within the first year."



**Sound Checker.** Gene Lemoine, a Technical Aide at Electric Boat's Acoustics Laboratory, adjusts some of the sound analysis equipment in the laboratory.

## Run Silent, Run Deep

# EB's Acoustics Laboratory Keeps Submarine Sounds at a Minimum

By Jim Reyburn

Noise is something a submarine roaming the depths on patrol doesn't want to produce, since the vessel's mission demands that it remain undetected, hidden in the background noise of the sea.

No group of people is more aware of the need for submarine "hush-hush" than the 100-plus employees at Electric Boat who make sure that every submarine delivered to the U.S. Navy from the shipyard meets noise design objectives — both for detectability purpose and for crew comfort.

With "quiet" as the watchword, sound technicians and engineers team up to make EB's subs free of clatters, hums, whines, gurgles, thumps and other sounds to ensure that the vessels can hear and not be heard.

They do their work with a special knowledge and more than two million dollars worth of the most sophisticated sound and analysis equipment in the world.

"While the diagnostic approach to sound testing has remained basically the same over the last 10 years," says Bill Lillie, EB's Chief of Sound and Vibration, "the technology has improved tremendously. The result is that we get much more information a lot quicker with higher quality answers."

### Hours Instead of Weeks

Lillie says, for example, that a decade ago it might have taken weeks to set up, run and analyze a test to determine vibration modes of a structure. Today, because of technological advances, the job takes only a few hours.

Lillie's colleague, Agnes Summers, Chief of Acoustic Design and Noise Reduction, points out how the advanced technology saves time. "We can troubleshoot in much less time now," she says. "Portable analyzers and computers enable us, in some instances, to go right on board a sub and get the noise levels we need to evaluate data right on the scene. This saves taping, then going back to the lab for analysis and comparison."

Summers cites a noise problem on one submarine as an example. "We heard something that was making too much noise in three staterooms," she explains. "We went on board, determined what it was, analyzed it and then went back and designed a method of lowering the noise to an acceptable level."

The group then installed what's called a temporary design "fix," measured the sound level again and the "fix" became permanent.

George Fagan, Chief of Acoustic Engineering and Trials, gives another example of what technology improvements have provided in the sound field. "The instru-

mentation available today gives us the ability to analyze large volumes of data. That capability simply didn't exist 10 years ago." Fagan singles out high-speed digital signal processing equipment as the single most important development in analysis technology over the years.

Surprisingly, the basic equipment, though very expensive, is off-the-shelf material. Recording machines, for instance, are standard 14 and 28-track models. But they're modified for their unique task. These machines are the "frontline," used for taping the sounds of analysis.

### Sounds Identified

Two computers, both modified standard models, anchor the analysis end of the operation. One takes tapes — analog broadband tapes — and breaks them down to narrower "bands" (one-third octave bands, for example), which start giving character to specific sounds, separating them from background noise.

The second computer performs basically the same function, but to a greater degree, providing better resolution to more clearly identify sounds. This computer can also be tied in with separate analyzers to enable 14 separate narrow band analyses at one time. Ten years ago, technology would only permit running two such analyses at one time.

Understandably, the advances are a plus. Technicians record 100 to 200 tapes during testing of each submarine. That usually adds up to 600-700 tapes of analog data for analysis each year.

Don Elkins, of the Sound Analysis Laboratory, receives the tape recordings from Carl Kiely, Acoustic Data Acquisition Services Supervisor, who operates an instrumentation laboratory which provides the instruments, facilities and technicians necessary to conduct the sound tests.

After analysis of the tapes, results are relayed to various engineering and design groups to reduce or eliminate specific sounds, if that's necessary.

The lab also maintains a library of 5,000 tapes for ready reference. They often come in handy for comparing sounds.

Since lack of noise ranks very high on a sub's operational priority list, sound tests, called "surveys," run the gamut you might expect. At dockside, there's an "overside" survey that picks up noises of auxiliary machinery emanating from the sub. A "structure-borne" survey checks noise from all new machines both before and after installation and is used for diagnostic measurements.

### Measurements on Sea Trials

When the sub puts out for sea trials, there are "radiated" and "platform" noise surveys to measure noise levels under actual operating conditions.

Other tests that are only visual include the "topside" and "housekeeping" survey (checking for loose gear), a "system isolation" survey and a "sound transmission loss" survey.

What of the future in submarine silencing? "It's important to recognize that ship silencing starts in design," says Summers. "If silencing isn't designed into a ship, it won't be quiet."

"We're using new design techniques and new silencing features to reduce submarine noise," she continues. "To speed up our design process we're looking to CAD/CAM (Computer Aided Design and Manufacturing). And we're using computerized modal analysis with visual displays."

"Our personnel are the key, though, to the proper use of all these high technology tools and our engineering staff is acutely aware of the new tools of the trade," says Summers.

Meanwhile, with that awareness, Electric Boat sound personnel will continue working with those improving technological tools in a state-of-the-art fashion to produce the quietest submarines possible.

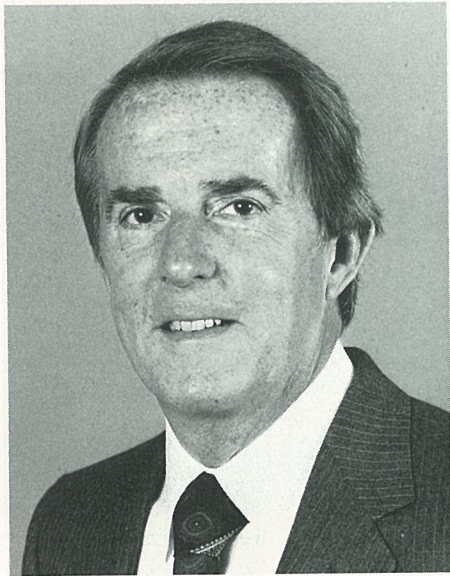


## James R. Mellor, George A. Sawyer Receive Key Executive Assignments

# GD World

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James R. Mellor

James R. Mellor, formerly General Dynamics Executive Vice President-Corporate Planning and International, has been named Executive Vice President-Marine, Business Systems and Corporate Planning, and George A. Sawyer, recently resigned Assistant Secretary of the Navy (Shipbuilding and Logistics), has joined the company as Executive Vice President-Land Systems and International.

Reporting to Mellor will be the Vice Presidents-General Managers of the Electric Boat and Quincy Shipbuilding divi-



George A. Sawyer

sions; the President of DatagraphiX; and the Vice President-Corporate Planning, according to David S. Lewis, Chairman and Chief Executive Officer. Reporting to Sawyer will be the Vice President-General Manager of the Land Systems Division, the President of General Dynamics Services Co. and the Corporate International Business Development Department.

President Reagan announced the selection of Sawyer as Assistant Secretary of the Navy in May 1981. At that time, Sawyer was President and Chief Executive Officer of John J. McMullen Associates, Inc.

Sawyer previously held a number of increasingly responsible management positions with Bechtel Incorporated, which he joined in 1969 as Manager of Environmental Systems. In his last position with Bechtel, he was Manager of Eastern Operations and Vice President of International Bechtel Inc., with responsibility for the company's major projects in the Middle East.

Earlier in his career, Sawyer was Nuclear Power Coordinator-Marine Projects with Babcock & Wilcox, and held the position of Manager-Marine Systems with NUS Corporation and the Battelle Memorial Institute.

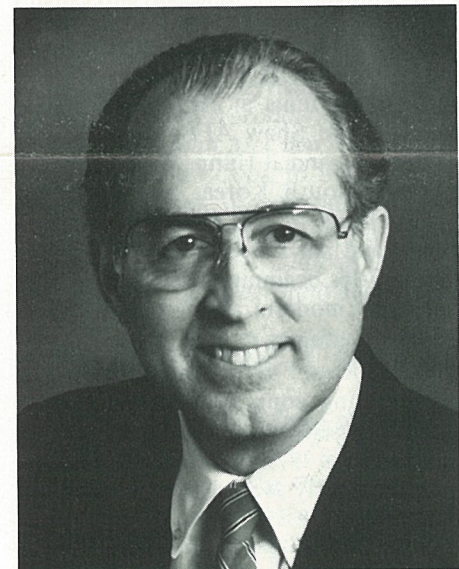
Sawyer, 52, is a native of New York and was graduated from Yale University in 1953 with a Bachelor of Arts degree.

Mellor joined General Dynamics as Executive Vice President-Commercial Systems and Corporate Planning in October 1981. Before joining General Dynamics, Mellor was President and Chief Operating Officer of AM International, Inc.

Earlier, Mellor was employed for 18

*Continued on Page 3*

## A. H. Rambeau Corporate V.P. Ind. Relations



Arch H. Rambeau

Arch H. Rambeau has been promoted to the position of Corporate Vice President-Industrial Relations. He succeeds Warren G. Sullivan, who has retired from the company after serving in that position for the past nine years.

"Warren Sullivan has made many important contributions to the success of the company," said David S. Lewis, Chairman and Chief Executive Officer. "We all wish him much happiness in his retirement and success in his future endeavors."

Lewis said all of the functions which have reported to Sullivan will report to Rambeau, with the exception of the Corporate Administrative Department, headed by John C. Kane. Rambeau and Kane will report to Gordon E. MacDonald, who will now serve as Executive Vice President-Finance and Administration.

Rambeau, 48, has served as Staff Vice President-Personnel Relations since 1978. He joined General Dynamics at Convair in 1959 as a manufacturing analyst and served in a number of increasingly responsible management positions before transferring to the Industrial Relations Department in the corporate office in 1967.

In 1969, he was named Director of Management Relations and Development and in 1973 was promoted to Director of Personnel and Management Relations.

A native of Borger, Tex., Rambeau holds a Bachelor of Science degree in Industrial Management from San Diego State University.

## Innovative Coal-Fired Coal Carrier Is Christened at Quincy Ceremony

Four thousand invited guests, shipyard workers and their families looked on as SS *Energy Independence*, the first coal-fired collier to be built in the United States in more than 50 years, was christened at Quincy Shipbuilding by Mrs. Mildred M. O'Neill, wife of House Speaker Thomas P. O'Neill, Jr., during ceremonies on July 9th.

In a keynote address, Speaker O'Neill, head of the Massachusetts congressional delegation, said, "This ship, *Energy Independence*, is yet another example of why this is a great shipyard. This highly automated, self-unloading collier represents a significant breakthrough in coal-fired shipbuilding."

*See Related Story Page 4*

*Energy Independence* will carry 2.4 million tons of coal a year from East Coast coal terminals to Massachusetts for the New England Electric System.

"Because of the innovations made in the construction of the *Energy Independence*, Massachusetts once again has the lead in an important market of the future — the market for modern coal carriers," O'Neill said. "This market is developing because the people of this country are realizing that our dependence on foreign oil is a very real threat to the national security and to the national economy."

In his address, Guy W. Nichols, Chairman of New England Electric, said, the ship "will improve the security of New England's energy supply and reduce the energy costs for the customers of the New England Electric system by over \$40 million a year."

New England Electric is currently burning coal at Brayton Point Station in Somerset, Mass., and Salem Harbor Station in Salem, Mass. Coal burning at these power generating stations means total savings of approximately 14 million barrels of oil per year.

Distinguished guests at the ceremony included: U.S. Representatives Edward P. Boland, Silvio O. Conte, Brian J. Donnelly and Joe Moakley; Charles Butler, Chairman of the Federal Energy Regulatory Commission; Adolph B. Kurz, President of Keystone Shipping Co.; Capt. Robert P. McKeever, Vice President of Keystone Shipping; Joan T. Bok, Vice Chairman of New England

Electric, and Glenn R. Schleede, President, New England Energy, Inc.

General Dynamics was represented by Oliver C. Boileau, President, and James R. Mellor, Executive Vice President-Marine, Business Systems and Corporate Planning, and Gary S. Grimes, Vice President and General Manager of Quincy Shipbuilding, who said in his welcoming remarks, "From bow to stern, this ship represents the latest in marine engineering technology, and bears about as much resemblance to the original colliers built at

*Continued on Page 4*

## U.S. M1 Unit Is High Scorer In Competition

A U.S. Army 3rd Infantry Division unit, using new Land Systems M1 Abrams tanks, achieved the highest composite score during the Canadian Army Trophy Competition that concluded at Begen-Hohne, West Germany in June.

The division's three competing platoons scored a composite 53,478 points, while three platoons of the West German Army's 293rd Panzer Battalion, using German-built Leopard 1 tanks, earned second place with a score of 50,352 points.

The third highest composite score was achieved by three platoons of the 2nd Battalion, 66th Armor, 2nd Armored Division (Forward) of the U.S. Army which used Land Systems M60A1 tanks.

This year's competition was significantly modified from past years, because the Northern Army Group and the Central Army Group (CENTAG) of NATO's Central European Command competed against each other. The teams were composed of companies from the nations in each group.

CENTAG won the trophy with a composite score for all participating platoons of 227,031—the U.S. Army's M1 Abrams tanks and the West German Leopard 1 tanks were both assigned to the CENTAG team.

The biannual competition is structured to analyze platoon proficiency. Twenty-nine of NATO's finest tank gunnery platoons took turns making simulated battle runs on a gunnery range.



**Collier Christened.** Mrs. Mildred M. O'Neill christens SS *Energy Independence* with champagne in ceremonies at Quincy Shipbuilding, watched by her Matron-of-Honor, Mrs.



Michael O'Neill, and Gary S. Grimes, General Manager of the shipyard. At right, *Energy Independence* under way.





**F-16 No. 1,000.** The ceremony marking the delivery of the 1,000th F-16 was witnessed by thousands of employees inside the mile-long aircraft assembly plant at Fort Worth on July 8th. Dignitaries at the ceremony included (from left): Oliver C. Boileau, General Dynamics President; Lt. Gen. Thomas H. McMullen, Comman-



der of the Aeronautical Systems Division; Senator John Tower of Texas; Dr. Tom Cooper, Assistant Secretary of the Air Force for Research, Development and Logistics, and Herbert F. Rogers, Vice President and General Manager of Fort Worth Division.

## Ceremony at Fort Worth Marks Delivery of the 1,000th F-16

Ceremonies marking the delivery of the 1,000th F-16 Falcon fighter were held at Fort Worth on July 8th.

The milestone aircraft is scheduled to be assigned to the U.S. Air Force's 388th Tactical Fighter Wing at Hill AFB, Utah, the unit which received the first operational F-16 in January 1979.

In remarks at the ceremony, which was attended by several thousand division employees, representatives of the U.S. Air Force, allied air forces and some of the thousands of subcontracting firms, U.S. Sen. John Tower, Republican of Texas, said: "The F-16 is without a doubt the most popular, most cost effective fighter aircraft in the world.

"The excellence of this aircraft is a reflection of the professional excellence of all who have helped put this aircraft together. I think all of you who have had a part in this should be justifiably proud," the Senator said.

### "A U.S. Triumvirate"

Lt. Gen. Thomas H. McMullen, Commander of the Aeronautical Systems Division which oversees aircraft production, called delivery of the 1,000th F-16 "a great team effort, a U.S. triumvirate of the Air Force and a great aircraft company brought together through the strong backing of the U.S. Congress. That triumvirate is in partnership with the governments, air forces and aircraft industries of allies overseas.

"The milestone we jointly celebrate today certainly deserves special recognition and praise. Very few of our fighting systems these days are successful enough to warrant delivery of 1,000 of them — and yet in the F-16, I predict we will all be

back here to recognize the 2,000th."

Citing the uniqueness of the F-16 program in the world of weapons acquisition, international business and multinational cooperation, Gen. McMullen said, "We are here today because of teamwork. The same spirit that brought us together in the early 1970s still pervades this relationship. This teamwork . . . is remarkable because we are talking about engineers and manufacturing people, pilots and maintenance personnel in 10 nations, about operators and logisticians, legislators and executives, and all the people who had to pull together to make this program go. This has truly been a global effort. No one group of government, military or industry people could have done, unilaterally, for world peace and security, what we have done working together."

The general credited innovations in management as the key features of the successful F-16 production program.

"They led to management firsts that do credit to all concerned. They led to the first multiyear aircraft procurement and to an innovative industrial modernization program. Both of these are important, not just because they were the first, but because they saved the taxpayers' money.

"The multiyear procurement itself will save over \$250 million. And the combined impact of the in-house General Dynamics technology modernization effort and the subcontractor industrial technology modernization will produce savings of over \$500 million," he said, calling the F-16 one of the few modern aircraft to be produced in such a cost effective manner, because it is consistently under target cost and always on schedule.

The general noted that the F-16 copro-

duction team "has met the challenges and done it with style. Anyone who has seen the Thunderbirds, who just three months ago flew their first official F-16 demonstration at Nellis AFB, can verify its outstanding performance. This multirole fighter, now deployed by eight different nations at 22 different bases throughout the world, will soon be in two more nations."

### "A Super Machine"

"You've built a super machine. Our pilots like it. They find it to be a real winner in both the air-to-air and air-to-ground roles. It's a pilot's airplane," said Gen. McMullen, who as a pilot has logged more than 7,000 flying hours.

Maj. Gen. George L. Monahan Jr., Director of the F-16 Program, noted that 10 years ago when the prototype was being built, "We were interested in seeing whether fly-by-wire was going to work, not in thinking of the delivery of the 1,000th F-16.

"This has been a program of firsts: The first government multiyear buy, the first major international coproduction program and the first Technology Modernization Program."

Oliver C. Boileau, President of General Dynamics, called the delivery ceremony "an important milestone" in the F-16 program. "The 1,000th F-16 is like those that came before it, a product of the skills and capabilities of men and women here in Fort Worth and in hundreds of other U.S. cities, in Belgium, Denmark, the Netherlands and Norway, working together to produce this high-performance, high-technology fighter at the lowest cost and on schedule."

Herbert F. Rogers, Vice President and Fort Worth General Manager, noted that the delivery ceremony was "a salute to our people, our suppliers and to the operating air forces around the world.

"The F-16's future — thus yours and mine — looks very bright," Rogers said. "Production rates will be maintained to fulfill modernization and inventory needs for the U.S. Air Force, the Air Force Reserve and the Air National Guard as well as for our allies."

### Advanced Technology

"Through advanced technology development programs, MSIP, AFTI/F-16, F-16XL and others, the F-16 will remain a highly capable, yet affordable, fighter throughout the remainder of this century and into the next."

F-16s are currently being flown worldwide by the Air Forces of the U.S., Belgium, Denmark, the Netherlands, Norway, Israel, Egypt and Pakistan. Venezuela will receive its first Falcon later this year and the Republic of Korea is scheduled to take its first delivery in 1986.

Full-scale production of F-16s was ordered in 1977 under a multinational coproduction agreement in which industry in the U.S. and Europe produce components and systems for the high-performance fighter, with final assembly of the

aircraft at Fort Worth, at Fokker near Amsterdam in the Netherlands and at SABCA and SONACA facilities in Gosselies, Belgium.

### Additional 2,000 F-16s

Present plans call for the production of an additional 2,000 F-16s for the U.S. and foreign air forces over the next decade.

The F-16 coproduction program is the largest multinational military program in history, involving over 60 major subcontractors and suppliers in six countries, with thousands of other companies supplying parts and materials. Deliveries of the aircraft have been consistently ahead of schedule and under the costs projected when full-scale production was initiated in 1977.

Nearly 600 F-16s have been delivered to the USAF since 1979 and are operational with fighter units at Hill, Luke, Nellis, MacDill and Shaw AFBs in the continental U.S., and at Hahn, West Germany; Kunsan, South Korea; and Torrejon, Spain. Units of the U.S. Air National Guard and Air Force Reserve will be assigned F-16s beginning this year, a major step in the modernization of these important reserve forces.

Deliveries of F-16s to the four European participating countries, Belgium, Denmark, the Netherlands and Norway, were also begun in 1979. Israel received its first Falcon in early 1980; Egypt in 1981 and Pakistan in late 1982.

Pilots of the eight nations currently flying the multimission fighter have now accumulated over 350,000 flight hours.

## MRASM Passes Key Milestones In Tests, Review

Convair's Medium Range Air-to-Surface Missile program passed two milestones in June when the submunitions dispenser prototype completed a series of successful tests at Mojave and China Lake, Calif., and the design of the system completed its Critical Design Review by the Joint Cruise Missile Project.

During the ejection tests, dummy submunitions were successfully ejected in a variety of patterns designed to attack and cut enemy runways. Flight paths were chosen that were both parallel to and across the axis of the target runway.

The missile's submunitions dispenser has been designed to be capable of ejecting a variety of submunitions or mines; modules of various sizes can be installed to handle different munitions. Both runway-cratering bombs and combined effects bomblets have been tested at cruise missile speeds and altitudes.

With completion of the Critical Design Review, Convair will now proceed with production of the missiles to be used in the 1984 flight tests from B-52G aircraft.



The 1,000th F-16 on a Test Flight

### Savings and Stock Investment Values

Salaried	May 1981	May 1982	May 1983
Government Bonds	\$ 2.6052	\$ 2.9671	\$ 3.4923
Diversified Portfolio	2.1840	1.9268	3.1051
Fixed Income	1.2058	1.3413	1.5006
Hourly			
Government Bonds	2.6026	2.9643	3.4906
Diversified Portfolio	2.2316	1.9665	3.2495
GD Stock	\$32.0000	\$25.7500	\$52.3750



## Around the World... ...in GD

**CHQ:** James D. Adams transferred from Fort Worth and was promoted to Corporate Data Communications Systems Manager . . . Jana L. Godsey joined as Government Contracts Settlement Analyst . . . Jack N. Best joined as Corporate Director, Productivity Programs & Plans . . . Jack Baranson joined as Corporate Director, International Market Assessment & Development.

**Fort Worth:** G. D. Boyd and S. K. Shoemaker were promoted to Engineering Administrative Group Supervisor . . . T. R. Brewer and M. J. Hundelt to Field Service Engineer . . . F. Everts III to Financial Analyst . . . F. C. Ketter to Engineering Chief . . . V. L. Mash to Flight Captain.

**Pomona:** Denny J. Beroiz was promoted to Quality Assurance Project Engineer . . . Thomas W. Celmer to Group Engineer . . . Grant E. Gable and Dale J. Weber to Senior Project Engineer . . . Wayne M. Gross to Chief, Inspection . . . George R. Wink to Section Head . . . At Camden, Dale A. Armstrong was promoted to Senior Accounting Specialist . . . John M. Stewart to Technical Procurement Administrator.

**Convair:** Raymond Degn and Norman D. Pagel were promoted to Group Engineer . . . Charles Goforth to Operations Supervisor-Manufacturing . . . Thomas M. Heter II to Chief-Site Support . . . Kenneth C. Lejman to Senior Project Engineer . . . David A. Patterson and Richard I. Smith to Launch Conductor . . . Marvin G. Snell to Chief-Quality Control . . . Donald M. Dvorak and Bruce M. Hamlin to Operations General Supervisor-Manufacturing Control . . . William J. Erickson and Thomas J. Nordeck to Operations Supervisor-Manufacturing Control . . . Emil E. Franke to Group Engineer-Quality Assurance . . . David P. Garant to Financial Supervisor . . . William T. Pratt to Material Project Coordinator . . . Donna L. Shuffler to Material Operations Supervisor.

**Datagraphix:** Robert C. Atchley was promoted to Project Leader-Marketing Software . . . Edward Leszynski to District Sales Manager . . . Garnet E. Bremner to Production Planning Specialist . . . Kenneth E. Sellers to Tube Manufacturing Supervisor.

**DSD:** Richard Vertigan transferred from Western Center to St. Louis as Director-Productivity and Quality.

**Land Systems:** Samuel Moore was promoted to Chief of Plant Protection . . . David Dystant to Manager, Systems and Procedures . . . John Cottle to Quality Engineering Specialist . . . Clayton Davis to Product Engineering Supervisor . . . Bradley Waldrep to Chief, Quality Assurance . . . George Graunke to Assistant Program Management Chief . . . Ronald Frost, Harold Quackenbush, David Stewart and Currell Pattie to Supervisor, Engineering . . . Frank Kunze, James O'Rourke, Philip Deegan, Myron Woronowycz, Stanislaw Krasuch and Donald Schafer to Group Engineer . . . John McCuen to Chief, ILS Field Operations . . . John Pietrzak, Hoyt Jones and James Cook to Supervisor, Quality Assurance . . . Ronald Reynolds to Program Control Administrator . . . Michael Bolon to Assistant Program Manager-Engineering . . . Norman Hammes to ILS Manager-M1 . . . Norman Dyer to Program Management Chief . . . Robert Dean to Product Engineering Manager . . . Jack Barnett, Lawrence Dagostino and Jerome Laird to General Foreman.

## Emphasis On Quality Continues At Fort Worth's Sheet Metal Shop

Each F-16 produced at Fort Worth has approximately 5,100 sheet metal parts, making the Sheet Metal Fabrication Department the largest contributor of individual pieces to the manufacture of the aircraft's structure.

The sheet metal operation comprises 66 different task centers, or areas in the shop where manufacturing process work assignments are performed.

"Significant capital improvements have been realized in Fabrication and have greatly increased our ability to produce a higher quality product for less cost," says Mitch Cameron, Superintendent of the department. "Examples include numerical control sheet-stretch and sheet-wrap forming, numerical control routing and drilling and multiple-part forming on a bladder press.

"The changes we have made in our facilities, equipment and methods have enabled us to realize improvements in quality, productivity, schedule and cost. These improvements would not have been possible a few years ago," he says.

According to Cameron, "The various sheet metal parts on each F-16 go through 52 different combinations of task centers." Some of the task centers do the same jobs,

but the average sheet metal part has about 25 processes performed on it before it is mated into the airframe.

The processes performed in making a typical F-16 part, an interchangeable access-area door, exemplify the complexity in Sheet Metal Fabrication.

The raw material is first pulled and inspected, then sheared to a workable size. The material is then pre-formed on a stretcher machine, degreased and heat-treated to make the metal more pliable. Then the metal may be stored in a freezer until additional operations are carried out, so that it will not lose the material qualities gained in heat-treating.

The access door then undergoes finish forming on another stretcher, and tooling holes are drilled so it can be held securely during processes to come. Rough trimming, deburring and inspection are accomplished next, followed by chemical etching, vapor-degreasing and aging in an oven that gives the metal the desired temper. Additional processes performed before the part is forwarded to stock include drilling, routing, hole countersinking, chamfering, deburring and priming.

F-16 sheet metal parts vary in size from three-fourths inch by three-fourths inch to 4 feet by 11 feet, and thicknesses range from 20 thousandths of an inch to 375 thousandths of an inch.

The largest sheet metal part on the F-16 is a section of the center fuselage skin. Wing skins are considered machined aluminum parts, rather than sheet metal parts, because Sheet Metal Fabrication only contours the skins - other wing skin production tasks are performed by the Machine Shop.



**New Equipment.** Composites Laminating Center employee Sarah Ragsdale places a panel for an F-16 stabilizer skin on the new automated material handling system vehicle. The vehicle follows an invisible stripe of paint that it illuminates with an ultraviolet light.

## Equipment Boosts Production Capability in Composites Center

Fort Worth's capacity for building graphite-composite F-16 components has been doubled by the installation of a new tape-laying machine. The machine can use both one- and six-inch tape.

Productivity in the Composites Laminating Center will soon be further increased by an automated material handling system that is scheduled to go into full operation later this year.

The systems were developed under contract to the U.S. Air Force and will ultimately be coupled with other systems to create a totally integrated, high volume composites manufacturing facility.

The newest tape-laying machine is Fort Worth's third. One of the older machines in the Laminating Center lays up six-inch tape, while the other lays up three-inch tape.

Composite aircraft components, such as the F-16's horizontal and vertical stabilizers, are built up layer upon layer with epoxy-impregnated graphite tape that is 54 ten-thousandths of an inch thick. After lay-up, parts are cured under heat and pressure in an autoclave, or press.

Finished, cured skins are ultrasonically inspected for defects, drilled and fastened to the aircraft structure.

The automated material handling system will be used to move components from the tape-laying machines to the autoclaves. The system comprises a computer-controlled vehicle that follows a fluorescent guide path that is painted on the floor. The guide path is invisible to the eye but is illuminated by an ultraviolet light on the vehicle.

Directions are given to the vehicle by radio signals generated from a host computer. Inputs to the host computer can be made by terminal operators at work stations in the center.

Another feature of the material hand-

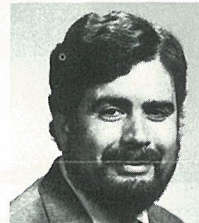
ling system is that its computer control allows it to be linked to a central data collection computer for detailed tracking of parts in work.

## John Garcia Named Programs Director For Range Systems

John G. Garcia has been appointed Programs Director, Range Systems, for Electronics Division. In his new position, Garcia will have responsibility for all instrumented range programs of the division.

Garcia joined General Dynamics in 1967 at Convair as a research engineer and transferred to Electronics in 1972. Since 1980, he has been program director for an international Air Combat Maneuvering Instrumentation training range.

Garcia earned bachelor's and master's degrees in Electrical Engineering from the University of Florida.



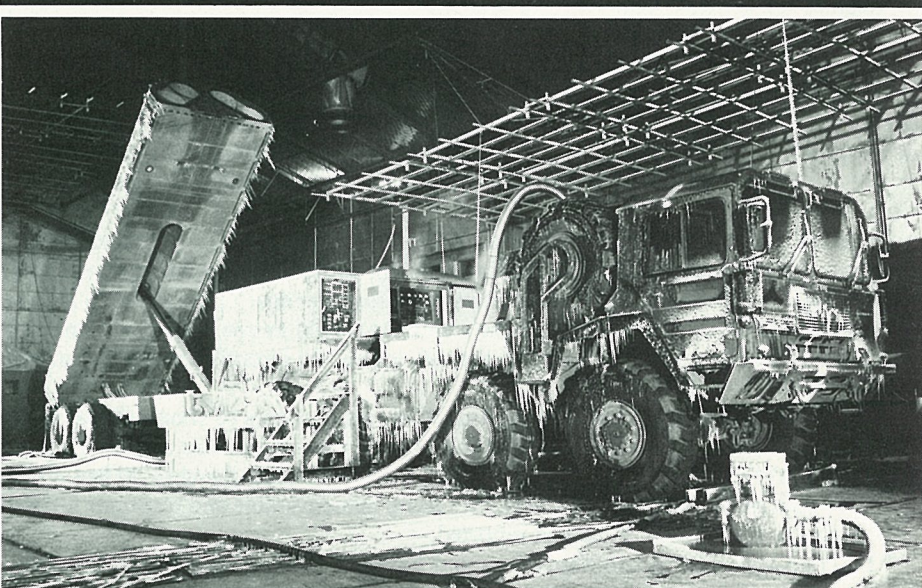
Garcia

## Key Executives

*Continued from Page 1*

years by Litton Industries, Inc., where he held a number of increasingly important engineering and management positions, including Corporate Executive Vice President in charge of Litton's Electronic Systems Group.

Mellor, 53, is a native of Detroit and was graduated from the University of Michigan in 1952 with a Bachelor of Science degree in Electrical Engineering and Mathematics. He was awarded a Master of Science degree from the same university in 1953.



**Freezing Rain.** A transporter-erector-launcher for Convair's Ground Launched Cruise Missile system undergoes a test in simulated freezing rain recently at the USAF's climatic laboratory at Eglin AFB, Fla. The system was also subjected to conditions of extreme heat, cold and blowing dust.

# GD World

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# Quincy's SS *Energy Independence* Has Many "Firsts" in Ship Design

By Dr. Rolf Glasfeld

(The author is Manager of Advanced Engineering at Quincy Shipbuilding Division.)

*Energy Independence* is the first coal-fired collier built in this country since the 1950s — and the first to be built at Quincy Shipbuilding since 1929. From its original concept through every detail of design and construction, the new ship is totally a product of Quincy's skills and resources.

The vessel is 657 feet long, has a beam of 95 feet and a draft of 31 feet. It will carry 36,000 tons of coal at a speed of nearly 16 knots. Along with collier construction programs in other countries such

## See Related Story on Page 1

as Spain, Italy and Japan, Quincy's ship is being built in recognition of the benefits — in cost and reliability of supply — of coal in comparison to oil.

*Energy Independence* will burn coal for propulsion identical to the coal it will carry to two Massachusetts generating stations of the New England Electric System now being converted from oil: one in

Fall River and the other in Salem. Average length of the ship's voyages will be about 600 miles, to and from coal terminals in Philadelphia, Baltimore, Norfolk or Newport News. The ship is jointly owned by New England Electric and the ship's operator, Keystone Shipping Company.

The owners decided on coal-fired propulsion after evaluating competitive bids for diesel-powered ships and for unmanned barges pushed by tugs.

## Dual Propulsion System

Air pollution is not a problem. The ship's coal-burning boilers emit visible smoke only when power is reduced to one third. Power from *Energy Independence*'s 12,000-horsepower steam turbine can be reduced to one sixth by operating with one of its two boilers. To reduce still further any possibility of pollution during maneuvering, and to permit longer trips without assigning large coal bunkers, the owners also specified a fully redundant oil burning capability. The result is a first-of-its-kind propulsion system.

The boilers for *Energy Independence* are notable for their size. Lower combus-

tion gas velocities, needed to prevent boiler tube wear in a coal-fired system, occupy twice the volume of oil-fired boilers. They are so large that the first two levels of the deckhouse, normally used for mess, galley and shops, are totally dedicated to ship's machinery.

The new ship is driven by coal conveyed from bunkers forward of the machinery space in a 10-cubic foot gulp every three minutes by a totally enclosed pneumatic transfer system similar to those employed not too many years ago, on a smaller scale, to distribute interoffice mail within a building.

After being crushed to a maximum size of 1.25 inches, the coal is mechanically thrown onto a conveyor within the base of the boiler. Finer coal particles burn during their arched flight to the back of the belt. Larger pieces burn on the belt itself.

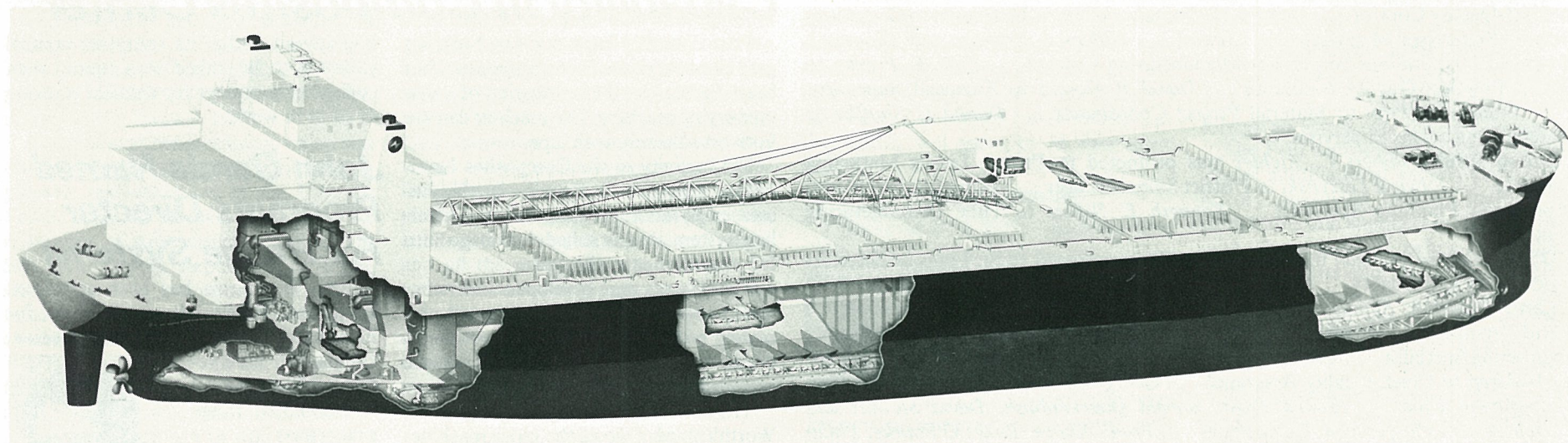
Ash, amounting to about one thousand pounds per hour, is discharged through openings below the ship's waterline when at sea — and stored aboard when in port. Ash is inert, sinks to the bottom and is classified as non-polluting. Transfer of ash

also takes place in a totally enclosed piping system, being moved by the suction created by a sea water eductor and then mixed with sea water to form a slurry.

## Unloading in 12 Hours

*Energy Independence*'s self-unloading cargo system is of a type proven in wide use over many years on the Great Lakes. Coal flows by gravity through a system of 80 hydraulic gates onto two four-foot wide conveyors traveling at 700 feet per minute. The coal is dumped onto two transverse conveyors which in turn dump it on an inclined belt that brings the coal above the main deck and onto a swiveling boom conveyor which discharges it at a distance of up to 214 feet from the ship's side. The entire cargo will be unloaded in 12 hours.

Although the basic technology of a coal-fired ship is hardly new, *Energy Independence* represents many "firsts" in its design and construction. Quincy's program has already generated considerable interest throughout the utility industry, particularly among those companies on the Atlantic seaboard working to reduce their dependence on imported oil by converting to coal — an abundant domestic resource.



Artist's Cutaway of *Energy Independence*.

## GD Flashback

### Convair's Pogo Pioneered True Vertical Flight

Fighter airplanes that can take off and land vertically are being operated today, but the concept is not new. In 1954, Convair built the first successful vertical takeoff and land (VTOL) airplane and it won the Harmon Trophy for its test pilot.

The airplane was the XFV-1 Pogo, one of the alternatives to carrier-based fighters explored by the U.S. Navy, and it was a radical departure from previous aeronautical concepts because it took off and landed with its fuselage perpendicular to the ground.

Winner of a 1951 design competition for a convoy escort fighter, the Pogo (from "pogo stick") was capable of taking off from and returning to the afterdeck of an ordinary cargo ship. It was anticipated that such a VTOL fighter could operate from a ship's fantail and provide defense and close support when aircraft carriers were unavailable. The Pogo took off vertically, swung into horizontal flight, returned and then backed down to a pinpoint vertical landing.

Design armament, although not actually installed, was four 20-mm. guns in wing-tip pods.

The Navy ordered the prototype on March 31, 1951, and it made its first free flight on August 1, 1954. The first complete transition from vertical to horizontal flight was made on Nov. 4, 1954. After about 69 flights, the test program was discontinued on the basis that, although the concept proved workable, the engines available at that time were not powerful enough to make the Pogo a satisfactory military airplane.

The Pogo had a wingspan of only 27 feet 8 inches and was 35 feet long. It had an empty weight of 11,742 pounds and carried 576 gallons of fuel. Its top speed was estimated at 610 mph, with a cruising speed of 414 mph. Its service ceiling was listed at 44,000 feet, and it was anticipated that the Pogo would climb to 11,500 feet in one minute and to 30,000 feet in just over four and one-half minutes.

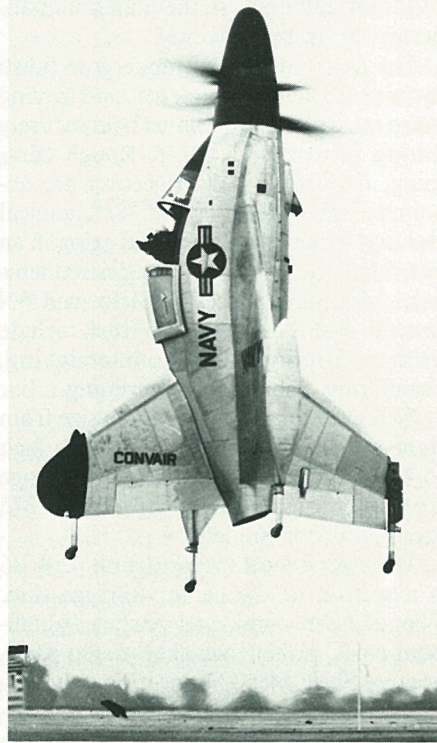
The Pogo looked indeed like a radical airplane. It had a short, fat fuselage, stubby delta wings and a pair of long vertical fins, one mounted above the fuselage and one below. On the ground the plane sat nose-up, resting on four caster-like wheels at the tips of the wings and fins. To enable the pilot to adjust to either vertical or horizontal attitude, Convair engineers came up with a seat that rotated 45 degrees for vertical flight, then slipped into conventional position for flying horizontally. A special ladder was designed to enable the pilot to reach the Pogo's cockpit.

At takeoff, the Pogo ascended vertically until well clear of the ground, then nosed over into conventional attitude for horizontal flight. To land, the pilot pointed the nose skyward and settled back to the ground by "hanging on the props." A special power plant was developed for the Pogo, combining a 5,850 horsepower Allison T40-A-14 turboprop engine with a pair of three-bladed, 16-foot, coaxial, contra-rotating propellers made by Curtiss-Wright.

Since no one had ever flown such a craft, engineers evolved a "tethered flight" test program. An elaborate mechanism for limited flight was built under the 184-foot roof of a Navy hangar at Moffett Field, Calif. Cables rose from the nose of the plane to a powered drum at the top of the hangar, running to a counter-weight at one side. A system of cables and tension regulators was attached to the tail, letting the aircraft rise freely but limiting its lateral travel.

J. F. (Skeets) Coleman, Engineering Test Pilot, made scores of short vertical flights in the hangar starting in April of 1954, feeling out the plane's controls and characteristics. On Aug. 1, 1954, he made the first untethered flight outdoors, rising to 20 feet. Over the next two days he worked up to 150 feet. "It's more maneuverable and responds faster than any plane I've ever flown," Coleman reported.

The Pogo was returned to San Diego and based at Brown Field Naval Auxiliary Air Station while Coleman continued testing — until he had taken the aircraft to several hundred feet, nosed it over to 30 degrees and traveled the length of the runway. He made the transition to full horizontal attitude the morning of Nov. 4, 1954, cruising for 20 minutes before returning to land on a 50-foot square. For this, the first successful airplane VTOL flight in history, Coleman was awarded the Harmon Trophy.



Pogo during a Test Flight

### Navy Lauds 35 Employees Of Electric Boat

Some 35 employees at Electric Boat's Groton, Conn., shipyard who comprised five support teams have been commended by the U.S. Navy for their work on the Post Shakedown Availability of the second Trident sub, USS *Michigan*, (SSBN 727).

The 35 drew praise from several Navy sources for their assistance on the project, equivalent to a 12,000-mile checkup in an automobile, which took place recently at Puget Sound, Wash., Naval Shipyard.

The five teams included those for technical support, design support, ship control, instrumentation and material.

The commendations came in three separate letters to Electric Boat Vice President-General Manager Fritz Tovar. They were from Capt. R. B. Horne, Jr., the Shipyard Commander; Capt. W. H. Cantrell, the Naval Sea Systems Command representative who commanded the on-site team, and Rear Adm. H. L. Young, at that time the Navy's Supervisor of Shipbuilding at Groton.

Capt. Horne, in his letter, called the Electric Boat personnel "of the highest caliber. Their dedicated and professional performance made them an invaluable part of the project team."

### Ship Christened

Continued from Page 1

Quincy as the space shuttle does to the Wright brothers' first airplane."

*Energy Independence* will be operated by Keystone Shipping Co. of Philadelphia, a private shipping company which operates more than 800,000 tons of commercial shipping vessels. When in operation later this year, the ship will travel at 15 knots and will make approximately 60 round trips per year from coal terminals in Baltimore, Md., Philadelphia, Pa., and Norfolk, Va., to New England.



## Convair GLCM Completes Key Testing Phase

The seventh and final U.S. Air Force developmental/initial operational test and evaluation flight test of Convair's Tomahawk Ground Launched Cruise Missile (GLCM) was successfully completed at the Utah Test and Training Range on July 27th (see photo page 3).

After being launched from its transporter erector launcher, the missile jettisoned its boost motor and transitioned to cruise flight. Using the Tomahawk's low-altitude terrain-following capabilities, the missile flew a fully-guided mission over a ground target on the range. Upon comple-

**From mid-April through July 27th, Tomahawk cruise missiles made eight consecutive successful test flights. They include five launches from a submerged submarine, two from ground-based launchers and one from the deck of the battleship USS New Jersey. Six of the tests were land-attack missions and two were anti-ship missions.**

tion of the flight, the missile's parachute recovery system was activated. The missile was safely recovered and will be refurbished for future use.

This was the 10th planned launch in the GLCM development program under the direction of the Joint Cruise Missile Project. Follow-on Test and Evaluation (FOT&E) will continue under the direction of the Air Force Operational Test and Evaluation Center, headquartered at Kirtland AFB, N.M. The FOT&E program will include additional test flights as well as evaluation of communications, maintenance and operational procedures.

The Tomahawk GLCM is scheduled to meet its initial commitment to NATO beginning with December deployment to Greenham Common, United Kingdom.

# GD World

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## Chairman Lewis Tells Shareholders First Half Was "Very Encouraging"

Net earnings for the second quarter of 1983 of \$72.7 million, or \$1.32 per share, were the highest for any quarter in the company's history, David S. Lewis, Chairman and Chief Executive Officer, reported on August 4th.

In his letter to shareholders, Lewis said, "1983 results to date have been very encouraging and the outlook for the year is bright."

Sales for the 1983 second quarter were \$1.8 billion, up 16 percent from the \$1.5 billion in the year earlier quarter. Earnings for the first half of 1983 were \$129.5 million, or \$2.35 per share, on sales of \$3.6 billion, both records for any six-month period.

In the second quarter of 1982 the company had a net loss of \$11 million, or 21 cents per share, when earnings were impacted by the company's action to write off \$99 million (pretax), or \$1.03 per share (after tax), to cover cost overruns on submarine and surface ship programs. From continuing operations in the second quarter of 1982, the company incurred a loss of \$600,000, or 2 cents per share. Earnings for the first half of 1982 were \$17.3 million, or 30 cents per share, and from continuing operations were \$39.7 million, or 72 cents per share, on sales of \$2.8 billion.

Lewis said funded backlog at the end of the 1983 second quarter was \$14.7 billion, and funded and unfunded backlog totaled \$18.4 billion.

During the second quarter, Electric Boat delivered the USS *Albuquerque*, the 14th SSN 688-class fast-attack submarine

built at the shipyard, and the USS *Florida*, the third Trident ballistic missile-firing submarine, both six weeks earlier than the current schedules.

Quincy Shipbuilding delivered the SS *Energy Independence*, the first coal-fired collier to be built in the United States in more than 50 years. This innovative self-unloading ship will carry 2.4 million tons of coal annually from East Coast terminals to power New England Electric's generating stations at Salem and Somerset, Mass.

Quincy is now completing the detail design work and has laid the keel for the

*Continued on Page 3*

## Donald Kelly, George Sawyer Elected to Board

Donald P. Kelly and George A. Sawyer have been elected to the General Dynamics Board of Directors. Kelly is Chairman, President and Chief Executive Officer of Chicago-based Esmark, Inc., and Sawyer is General Dynamics' Executive Vice President-Land Systems and International.

Kelly, 61, has 30 years of service with Esmark and its predecessor company, Swift & Co., which he joined in 1953 as Manager-Data Processing. In subsequent years, he held a number of increasingly important executive positions including Vice President-Corporate Development, Controller and Financial Vice President and Director. In 1973, when Swift & Co. and a number of other acquired companies became Esmark, Kelly was named President and Chief Operating Officer. He was elected President and Chief Executive Officer in 1977 and to the additional position of Chairman in 1982.

Kelly was associated with the United Insurance Company of America from 1946 to 1951 and with A. B. Wrisley from 1951 to 1953. He served in the U.S. Navy from 1942 to 1946.

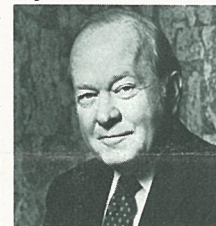
A native of Chicago, Kelly attended Loyola, De Paul and Harvard Universities, majoring in accounting and finance. He is active in a number of business, civic and educational institutions as director, trustee or board member.

Sawyer, 52, joined General Dynamics in June 1983 after serving as Assistant Secretary of the Navy (Shipbuilding and Logistics) since May 1981. Prior to his appointment to the Navy post, he was President and Chief Executive Officer of John J. McMullen Associates, Inc.

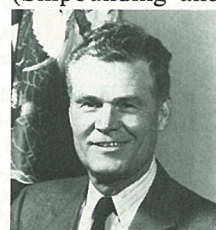
Sawyer previously held a number of increasingly responsible positions with Bechtel Incorporated after joining that company in 1969 as Manager of Environmental Systems. In his last position with Bechtel, he was Manager of Eastern Operations and Vice President of International Bechtel Inc., with responsibility for the company's major projects in the Middle East.

Earlier in his career, Sawyer was Nuclear Power Coordinator-Marine Projects with Babcock & Wilcox and Manager of Marine Systems at NUS Corporation and the Battelle Memorial Institute.

A native of New York City, Sawyer was graduated from Yale University in 1953 with a Bachelor of Arts degree. He served in the U.S. Navy from 1953 to 1962.



Kelly



Sawyer

## Atlas Launches USAF Satellite At Vandenberg

NAVSTAR-8, the latest in a series of Global Positioning System satellites, was launched into orbit on July 14th by an Atlas E launch vehicle from Vandenberg AFB, Calif.

W. G. Phillip, Convair Atlas Program Director, said that NAVSTAR-8, the eighth in the ongoing program of navigation satellites, was placed in a 10,900-statute-mile orbit by the Convair-built booster. This satellite is the first in the U.S. Air Force's Phase II program to provide a space-based, long-life radio navigation and nuclear detection system platform.

The NAVSTAR system is being developed by the Department of Defense to provide precise navigation data to U.S. and allied land, sea and air forces throughout the world by the late 1980s.

Phillip said that, after launch, the half-ton satellite was placed in a transfer orbit. An apogee kick motor on the satellite then placed the satellite into its final orbit.

The Atlas launcher, number 75E, was originally an operational Intercontinental Ballistic Missile manufactured by Convair in 1963. It was on alert with the Air Force when the Atlas system was retired in 1965 and most of the missiles were placed in storage.

During 1979 and 1980, Convair modified, refurbished, and delivered number 75E to the Air Force as a space launch vehicle assigned to NAVSTAR.

## Land Systems Delivers First Zero Defects M1

The first zero defects tank in the history of the M1 tank program was recently delivered to the North Carolina Army National Guard at Fort Bragg, N.C.

The zero defects M1 was one of a shipment of 22 tanks that were produced at the Lima (Ohio) Army Tank Plant. The De-processing Team reported only a few defects in the other tanks.

The De-processing Team is a group of experts sent with each shipment to inspect and test the tanks and process them at the receiving units. Through a joint U.S. Army/Land Systems effort, any problems identified by the De-processing Teams are reported to the tank plants for correction in the normal production cycle.

Statistics indicating a constantly improving quality in all Land Systems tank production point out the success of this effort. In June 1982, GDLS-responsible deficiencies identified in de-processing averaged 12 per tank. The most recent shipment averaged just slightly more than two defects per tank — a 600 percent improvement.

Since January 1983, 22 percent of the hull and turret structures have passed inspection with zero defects. Before November 1982, no turrets or hulls completed inspection without discrepancies. Also since January 1983, the total number of recorded defects at all Land Systems plants decreased by 32 percent.

These accomplishments were achieved despite increasing production rates that resulted in the delivery schedule being met or exceeded every month.

## 100 M60A3 Tanks For Saudi Arabia

The Department of Defense has notified the Congress it intends to sell Saudi Arabia 100 improved M60A3 main battle tanks which are manufactured by Land Systems.

The tanks will be equipped with 105-mm. rifled cannon, laser rangefinders and night-fighting thermal sights. Total price for the tanks will be \$176 million.

The announcement was the first U.S. agreement to upgrade Saudi Arabia's armored forces since 1980 when the Pentagon announced sales to the Middle Eastern nation of equipment to upgrade its M60-A1 tanks.

## Several Important Improvements Made to Salaried SSIP Program

Several important improvements have been made to the General Dynamics Savings and Stock Investment Plan for salaried employees.

Effective September 1st, the company will contribute an individual's designated deductions to the plan prior to calculation of the employee's Federal income tax — most state and local income taxes will also be calculated after the contribution is made. The result of this will be a lower base income from which income taxes are calculated.

"The Federal government recently changed the income tax laws to encourage individuals to build up income for the future," says Arch H. Rambeau, Corporate Vice President-Industrial Relations. "This change is aimed at providing an opportunity for individuals to save more for their retirement, and we've revised the SSIP to take advantage of the changes.

"The General Dynamics SSIP is one of the best plans in our industry," says Rambeau. "Employees may make a SSIP contribution of up to 10 percent of the first \$25,000 of their

salary and six percent of their earnings above \$25,000, matched by the corporation at 75 cents for every dollar contributed. Also, employees may now save up to an additional four percent of their entire base salary on a before-tax basis — without company match."

Another improvement is a loan provision that is being added to the plan, effective on January 1, 1984. Under the provision, an individual can borrow against his or her SSIP account up to certain limits. Funds borrowed from the plan and interest are paid back to the individual's account, increasing the individual's investment in the fund, and the individual has an opportunity for a tax deduction for the interest paid.

As before, all salaried employees with one year service with General Dynamics are eligible to join the SSIP. An individual may join the first of the calendar quarter after eligibility requirements are met.

Additional information will be distributed to salaried employees in the near future.

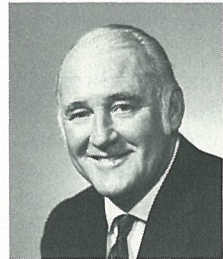
## Savings and Stock Investment Values

Salaried	June 1981	June 1982	June 1983
Government Bonds	\$ 2.6307	\$ 2.9708	\$ 3.5030
Diversified Portfolio	2.1383	1.9021	3.3103
Fixed Income	1.2161	1.3531	1.5146
Hourly			
Government Bonds	2.6279	2.9679	3.5012
Diversified Portfolio	2.1851	1.9413	3.3815
GD Stock	\$32.3750	\$28.0000	\$54.0000

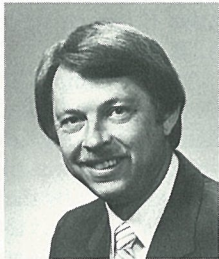


## Material Service, Marblehead Lime Announce Four Key Appointments

A number of key management appointments have been announced by Material Service Corporation and Marblehead Lime Company in Chicago.



Nagel



Blick

Gerald R. Nagel has been appointed President of Material Service, and Ronald L. Blick has been appointed Senior Vice President of Sales. At Marblehead Lime, M. D. Henery was appointed Executive Vice President, while Ernest E. Burgh was appointed Vice President-Operations.

Nagel's entire business career of 30 years has been involved in the building materials industry, 28 of those years were with Material Service. He served first in the Order Department, then as a Salesman, District Sales Manager, General Sales Manager, Vice President and subsequently, Senior

Vice President of Sales. He is a graduate of Loyola University of Chicago.

Blick has served with Material Service for 25 years and formerly held the positions of General Manager, Engineering and Materialite Sales; Manager, Quality Control, and Vice President-Sales. He attended Northern Illinois University.



Henery



Burgh

Henery joined Marblehead in 1966 after serving in executive capacities with several other lime manufacturers. His most recent position was Senior Vice President at Marblehead.

Burgh joined Material Service, Marblehead's parent company, in 1957. In 1965, he joined Marblehead where his most recent position was General Manager, Operations-Plants.

## Around the World... ..in GD

**CHQ:** Michael S. Parker transferred from Pomona and was promoted to Corporate Manager, Contracts . . . Danny H. Sokolowski joined as Corporate Network Traffic Engineering Manager . . . JoAnn J. Anchors joined as Corporate Manager, Military Program Analysis.

**Fort Worth:** R. L. Bath and R. S. Stastny were promoted to Senior Program Analyst . . . R. E. Brooks and J. A. Harbolt to Senior Field Service Engineer . . . L. G. Fisher and P. E. Hiatt to Field Service Engineer . . . S. G. Flippen to Senior Logistics Control Analyst . . . S. L. Fort, W. M. Psencik and R. A. Sweitzer to Financial Supervisor . . . T. Nakamoto to Industrial Engineering Specialist . . . D. F. Smith and D. S. Vining to General Supervisor, Tool Design.

**Convair:** Marvin E. James was promoted to Engineering Chief . . . Joseph B. Martinez and Asa B. Mercer to Manager-Manufacturing Control . . . Robert J. McFarland to Financial Supervisor . . . Frank Rockenback to Manager-Industrial Engineering . . . John Stoffel to Chief-Manufacturing Control . . . Kenneth F. Crotz Jr., to Operations Supervisor-Manufacturing Control . . . Joseph R. Chlad to Material Operations Supervisor . . . Clayton J. Dennis to Base Site Manager.

**Electronics:** Dick Blommer, Tom Fleming and Bill Kruger were promoted to Program Manager . . . Dan Evans to Senior Engineering Specialist . . . Jack Stewart to Senior Project Manager . . . Maurine Troy to Operations Section Head.

**Land Systems:** Roberta Heffner was promoted to Manufacturing Program Analyst . . . John Imbrunnone to Senior Production Planning Analyst . . . Rajinder Kapur and Gerard Austin to Quality Assurance Engineer . . . Linda Levandowsky to Senior Production Control Analyst . . . Ronald Milbauer to Senior Facilities Project Engineer . . . Gregory Jatenga to Senior ILS Field Engineer . . . Roger Cook to Field Engineer Representative . . . Jerry McComb to Foreman . . . James McCarthy to Assistant Project Engineer.

**Pomona:** M. J. Hartman was promoted to Senior Cost Control Analyst . . . At Camden, Bobby L. Launius was promoted to Supervisor, Manufacturing.

**Electric Boat:** D. Bower and R. Paige were promoted to Senior Supervisor-Planning . . . J. Browning to Manager of Graphic Reproduction . . . A. Cardente, W. Haelson and W. Hunt to Supervisor-Trade Planning . . . W. Crandall, A. Kannenburg and J. Kickolenko to Group Trade Planner . . . S. Devoe to Supervisor of Trade Control . . . E. Donacki to Superintendent-Division Services . . . R. Dragoo and R. Gardella to Assistant Superintendent . . . S. Ellinwood to Principal Test Engineer . . . J. Ensley to Purchasing Representative Specialist . . . C. Franklin, M. Maderia, R. Martin, M. McDonald, J. O'Neill and H. Sexton to General Foreman . . . P. Freudenstein to Administrator, Material Planning . . . T. Hurlock to Guard Captain . . . S. LaPalme to Senior Supervisor of Security . . . W. Lillie to Manager, Nuclear Engineering Analysis . . . R. Lohmann, C. Pan and C. St. Germain to Engineering Supervisor . . . A. Mador and P. Risseuw to Superintendent . . . T. O'Brien to Senior Supervisor, Traffic and Transportation . . . R. Sears to Senior Ship Superintendent . . . R. Secor to Chief, Safety and Industrial Hygiene . . . T. Sullivan to Ship Manager . . . W. Traber and R. Value to Foreman . . . E. Wenderoth to Administration/Control Coordinator . . . C. Shields to Manager, Planning and Administrative Control . . . Q. Keefe to Cost Estimating Specialist . . . M. Alloway to Fairwater Store Administrator . . . T. Jackson to Site-Planning Supervisor . . . M. Savin to Deputy Site Manager-Material Services . . . At Avenel, J. Torstrup was promoted to Foreman I . . . At Quonset Point, E. Kaminski was promoted to Supervisor, Production Methods Engineering . . . R. Lavoie, J. Maki, A. Mole, G. Andrescavage and A. Silvia to General Foreman . . . L. Morse and L. Sullivan to Manager-Operations . . . S. Correia to Group Trade Planner . . . C. Hammond, P. Roy and H. Winthrop to Chief, Material Planning . . . R. Hackett to Supervisor, Material Planning . . . D. Wilcox and J. Pfeifer to Superintendent.

**Datagraphix:** W. H. Flora was promoted to Computer Systems Specialist.

**GDSC:** R. C. Partridge was promoted to Manager of Construction Installation for UPM Project.



An F-16 from the South Carolina Air National Guard

## First Air National Guard Unit Receives Front Line F-16 Falcons

The 169th Tactical Fighter Group of the South Carolina Air National Guard formally received its first F-16 aircraft last month in a ceremony attended by nearly 2,000 persons.

The unit became the first Air Force Reserve or Air National Guard unit to be assigned the front line fighter. Other Reserve and Air National Guard units will begin receiving the F-16 later this year.

"This proves that the total force concept is alive and well," Lt. Gen. John L. Pietrowski, Commander of the Ninth Air Force, said in a ceremony at McEntire

"I want to congratulate the people who are responsible for building this great plane," said U.S. Representative Floyd D. Spence, of South Carolina, in whose Congressional district the base is located. "And I want to congratulate the U.S. Air Force for showing extremely good judgment in selecting you as the first Guard unit to fly the F-16."

Spence noted that David S. Lewis, General Dynamics Chairman of the Board and Chief Executive Officer, is a native of South Carolina.

Three General Dynamics executives, Edward J. LeFevre, Vice President-Government Relations, F. A. Curtis, Fort Worth Vice President and F-16 Deputy Program Director, and David J. Wheaton, Fort Worth Vice President-Marketing, represented the company at the ceremony.

South Carolina is the first state in which two bases are now flying the F-16. They are also flown by an active Air Force unit at Shaw AFB, about 10 miles from McEntire.

### Facility Expansion

Pomona has awarded a \$1.5 million contract for construction of an approximately 37,000-square foot addition to its existing 178,000-square foot facility at the Airport Industrial Park in Camden, Ark.

The one-story addition will provide space for program offices, accounting, purchasing, procurement, contracts and estimating, and for the expansion of the employee cafeteria.

Construction is scheduled to be completed by the end of the year.



ANGB, S.C. "You, in the 169th Tactical Fighter Group, are the rightful pacesetters for the most versatile fighter in the world."

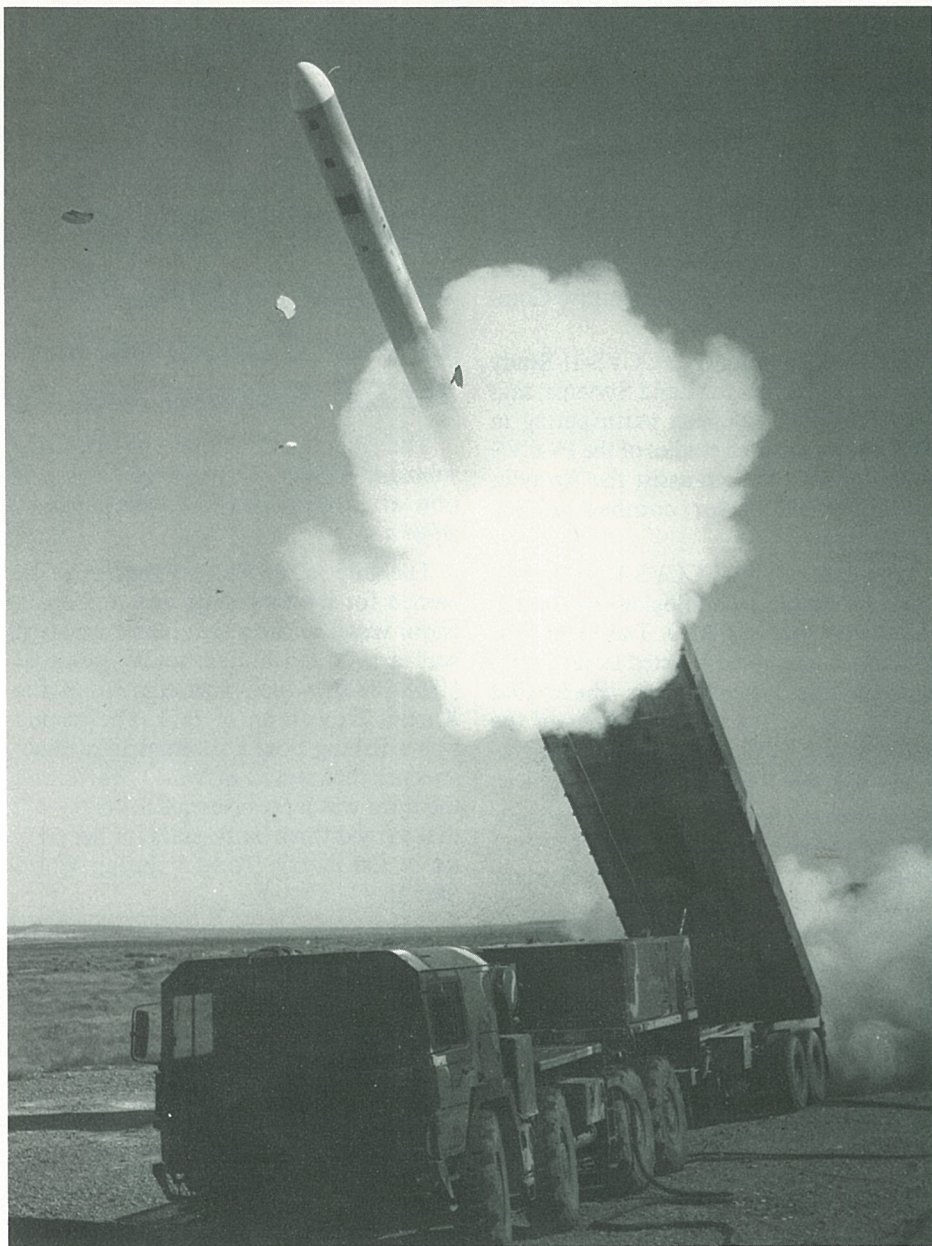
The group's transition from A-7D aircraft to the F-16 Falcon "points up the essential role of the 169th in our total military posture," added Maj. Gen. T. Eston Marchant, Adjutant General of South Carolina.

Twice in the last six years, the 1,300-member Guard unit has won the U.S. Air Force's Outstanding Unit Award. In the 37-year history of the Group, its air crews have flown the P-51, F-80, F-86, F-104, F-102, A-7D aircraft and now the F-16 Falcon.



**Peacekeeper.** Convair delivered the 15th "Peacekeeper" Composite Deployment Module in July to AVCO Systems Division. Above, Roy Williams, Convair Manufacturing Planner (left), and Rod Stith, Manufacturing Engineer, check a module prior to shipment. Peacekeeper is the name for the nation's newest ICBM, formerly called the MX.





Tomahawk GLCM Begins July 27th USAF Test Flight

## Chairman Lewis Tells Shareholders First Half Was "Very Encouraging"

Continued from Page 1

first of five Maritime Prepositioning Ships (previously called T-AKX) ordered by the U.S. Navy late last year. This production program will build up later this year, with delivery of the first MPS ship scheduled for early in 1985.

Earnings in the aerospace group were again led by Fort Worth, which continued to maintain its ahead-of-schedule and on-cost position in the F-16 production program. "A recent highlight was the delivery of the 1,000th F-16, an important milestone in the long-term production program planned for this outstanding fighter," Lewis said. "In May, the first of the 480 F-16s ordered by the U.S. Air Force under an innovative multiyear contract was delivered on schedule."

"Convair made excellent progress on the Tomahawk cruise missile program," Lewis said. Pomona continued to do well on development and production of its many tactical missiles and gun system programs. "Sales and earnings at Pomona increased substantially over the same period last year, and we expect this pattern of growth to continue well into the future."

Land Systems is maintaining the scheduled delivery rate of 60 M1 main battle tanks per month while achieving significant improvements in production efficiencies and product quality. During the second quarter, the division delivered the 1,000th of the more than 7,000 M1s required by U.S. Army and Army National Guard units. Production of M60A3 tanks for sale to foreign governments continued at a rate of 30 per month.

"The company's commercial business units performed reasonably well and were modestly profitable during the quarter despite the continuing difficult economic conditions in their market areas," Lewis said.

## Electronics Receives Two Army Contracts

Electronics Division has been awarded two contracts by the U.S. Army's Communications - Electronics Command, one to study the Army's future automatic test system requirements and the other to apply computer switching technology to tactical communications systems.

The division is one of five contractors selected for the Phase I pre-design and study contract of the Automatic Test Support System program, which will develop a standard set of automatic test equipment capable of supporting a variety of weapons systems. It will consist of two sub-systems: a Basic Shop Test Facility, which will be sheltered and mounted on a standard Army vehicle, and a Contact Test Set, which will be man-portable and used by support teams in both maneuver and fire battalions. Army plans call for selection of two contractors to build the prototype equipment and conduct a limited Full Scale Engineering Development.

The second contract calls for the division to design and build three Packet Message Interface (PMI) units to support Army tactical communications and battlefield distributed processing.

By applying packet switching and computer networking technology to existing Army tactical communications systems, the number of users of a given communications network can be increased, and message accuracy, both teletype and computer, can be improved. Up to eight different users will be able to transmit message packets simultaneously over a single communications channel using one PMI unit.



Deployment Extenders. A pair of KC-10 Extender tanker cargo aircraft link up over southern California.

## Convair Delivers 400th Fuselage For McDonnell DC-/KC-10 Aircraft

Convair delivered the 400th DC-/KC-10 fuselage in mid-July, marking the 397th on-time completion in the program. George Williams, Director of the Aircraft Programs Product Line, attributes this record to the contributions of all the support departments as well as the actual production teams:

"Too often, the credit goes to just the people who assemble the product," he said. "Without the people who get the right parts to the right place at the right time, we could not keep up this on-time completion rate."

The fuselage, the 23rd built for the U.S. Air Force's KC-10 Extender tanker-cargo plane, was rolled out of the Lindbergh Field plant on special trailers and barged up the California coast to McDonnell Douglas' Long Beach factory. The finished aircraft is scheduled to be delivered to the Air Force in the spring of 1984.

The KC-10 first entered the Air Force inventory in March 1981. Based at Barksdale AFB, La., and March AFB, Calif., the KC-10 has performed well as both a cargo carrier and an aerial refueler.

So named because it greatly extends the Air Force's deployment capabilities, the Extender is able to replace both KC-135 tankers and cargo aircraft during tactical fighter unit deployments.

Convair delivered the first DC-10 fuselage in February 1970, and the first sections for the Air Force version in August 1979. Except for a few times when weather along the California coast delayed the barge shipment, Convair has maintained its record of on-time delivery.

By the end of 1983, the Air Force will have received 20 KC-10s; the current schedule calls for delivery of eight planes in 1984, 11 in 1985, 12 in 1986 and nine in 1987. Six hundred Convair workers are involved in building the fuselages.

### Admiral Hostettler:

## Tomahawk Job Done Because Of "People Who Do the Work"

Following a two-day program review at Convair, Rear Adm. S. J. Hostettler, Director of the Department of Defense's Joint Cruise Missile Project, spoke to all Tomahawk workers at the company's three San Diego plants.

Adm. Hostettler told the workers that he had had many meetings with the Convair program management in the past year, and that he was convinced that the company was turning out quality missiles. "But, you don't make it happen on Vu-graphs; you make it happen putting missiles out the door," he stressed.

According to Adm. Hostettler, the Tomahawk cruise missile is spearheading a change in naval warfare. "For 30 years," he said, "the Navy's offensive strike capability has been the aircraft carrier, its pilots and its crew."

"What we are doing here today," said Hostettler, "is providing an alternative strike capability. It forces an enemy to concentrate on every surface ship and submarine that is going to carry one of these rounds, not just on the carriers. There are no more free rides for them."

Hostettler emphasized the importance of understanding how the job of providing this alternative gets done. He said, "It gets done because engineers design the thing right to begin with. It gets done because the finest management team that this corporation can assemble is in place and trying to get it done."

"But it gets done, really, because of the people who do the work. It is each of you that produces the product, this revolutionary way of warfare."

"This doesn't happen by luck or good management," said Hostettler. "It happens because you know what your job is, and you're doing it right."

"Thank you very much for one fine effort."

In introductory remarks before the meeting, M. C. Keel, Convair Vice President and Cruise Missile Program Director,

stressed the need for attention to detail in design and manufacturing. He noted that in early 1983, the program faced the difficult task of increasing and sustaining rate production.

This challenge has been met, Keel said. "That turnabout was made, and that rate has been sustained, and in fact, you folks have gotten us a month ahead of schedule," he said.

As important as the production schedule is, Keel said, the quality of the hardware is even more important: "You can't inspect quality into hardware, the manufacturing people have to manufacture in the quality. It's you people out there making the detail parts that really determine our performance," he said.

How has that performance been? According to Keel, "Since the first of the year, we have delivered and flight tested 11 Tomahawk missiles. Ten of those 11 have been total successes. They have been launched from a variety of platforms, they went through all of the proper sequences, and they flew for hours to get to their targets."

"In addition to those test missiles, we have delivered 32 quality rounds to the U.S. Air Force and the U.S. Navy," he said. "That is a very, very significant accomplishment on your part."

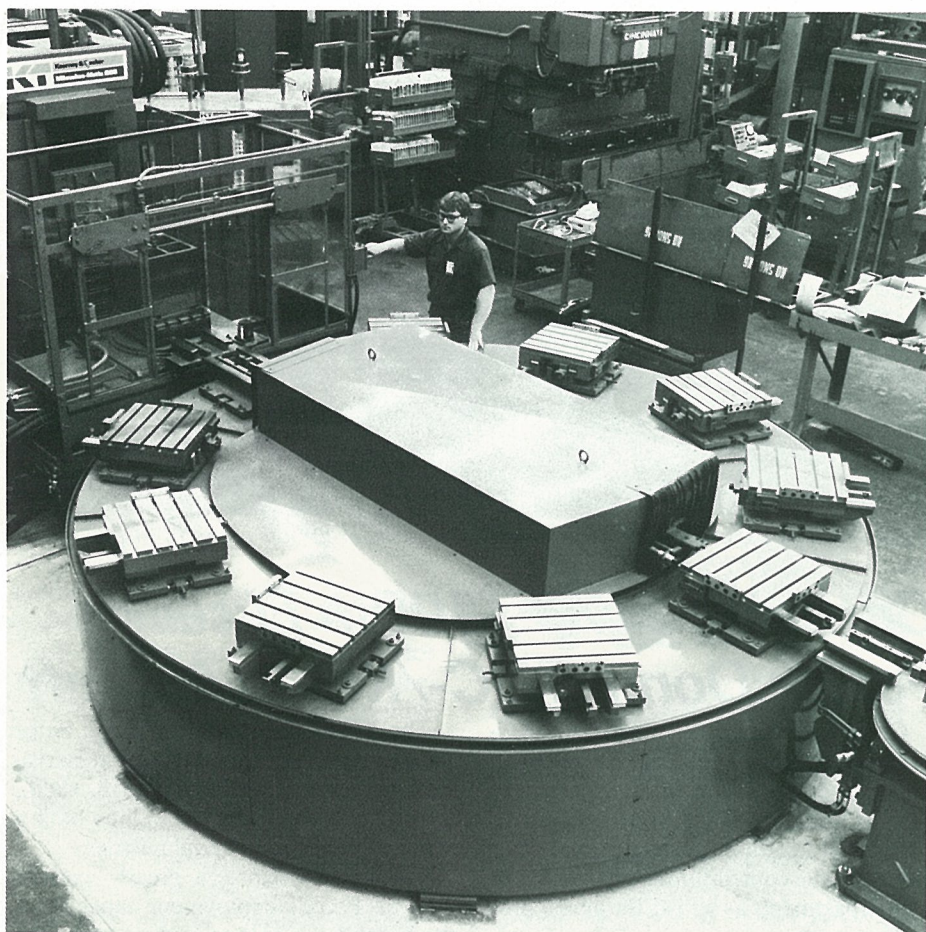
Following his remarks, Adm. Hostettler showed the workers a film clip of scenes from some of the recent flight tests, showing the Tomahawk being launched from submarines, from the battleship USS *New Jersey*, and from a ground launcher and hitting the targets, both a target ship and a net stretched across the Nevada desert.

The admiral then presented the first of a set of flags made to identify contractors in the Tomahawk program, and said that he wanted to return in a year or less to present the company and its employees with a gold "E" for sustained excellence in performance.

# GD World

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**New Machining Center.** This numerically controlled machining center in Pomona's Mechanical Fabrication Department has improved Pomona's production procedures. The machine is capable of automatically performing precision milling, drilling, reaming, boring and tapping.

## Unconventional Machining Center Will Allow Increased Production

To keep pace with the state-of-the-art in machining of General Dynamics products, Pomona has installed an "unconventional machining center" in Department 51, Mechanical Fabrication. The equipment was purchased by Naval Sea Systems Command as part of the U.S. Navy's modernization program at the Pomona facility.

The numerically controlled machine is equipped with a 10-pallet shuttle carousel system with a load station and pallet code reader. The four-axis rotary table is capable of holding four parts on each pallet (one to each side of the pallet).

The machine has an automatic random-select 68-tool magazine and is capable of automatically performing precision milling, drilling, reaming, boring and tapping operations in any sequence or combination.

Dale Fagg, Staff Engineer in Plant Engineering, said the machining center, plus a second unit which will arrive later, will enable the division to significantly increase production.

"The machine will be operated by direct numerical control on a remote basis at this time," he said, "but it can also be run by tape control. Tape control dictates operations, sequence, feeds, speeds, other auxiliary functions and contour in all axes."

Mike Dykes, Facilities Specialist in Plant Engineering, says the machine is capable of running three shifts: "The center can be monitored from a distance through the use of colored lights mounted on top, which indicates the operating status of the machine. It is equipped with a probe which inspects the machined parts, and verifies that the tool is in good shape before moving on to the next pallet."

## Attack Submarine Hyman G. Rickover Launch Scheduled

Electric Boat's second launching of the year will take place August 27th when the fast-attack submarine *Hyman G. Rickover* (SSN 709) slides into the Thames River at the division's Groton, Conn., shipyard.

Adm. James D. Watkins, Chief of Naval Operations, will be the principal speaker at the 11:30 a.m. ceremony. Mrs. Rickover will christen the 360-foot, 6,900-ton vessel.

The sub is named for the retired admiral who is the former head of the Navy's Nuclear Propulsion Program and is known as the "Father of the Nuclear Navy."

"A fixture is loaded on each pallet, then one to four parts are mounted on each fixture, according to the size of the parts," Dykes said. "The carousel then rotates each pallet to the machine, where the 68 tools are capable of performing the various production steps. The parts can be all alike, or each one can be different. The steps required for each part can be controlled by the tape control."

## GD Flashback

### NR-1—A Versatile Research/Rescue Submersible

Although built originally by Electric Boat as a submersible research vehicle and as a test platform for a small nuclear power plant, the NR-1 has been doing a variety of intriguing jobs for the U.S. Navy.

In addition to working for science, the nuclear-powered NR-1 also can be utilized in a search and rescue role.

When the NR-1 entered service on Oct. 27, 1969, she became the Navy's first atomic-powered service craft. She was designed primarily for mapping the ocean bottom and for conducting exhaustive studies of the temperature, currents and other oceanographic conditions 3,000 feet below the surface of the ocean. In this work, she is supported by a mother ship on the surface.

The NR-1 is fitted with wheels beneath her hull to allow bottom crawling and eliminate the need for hovering while exploring the ocean floor. In addition, she has external lights, external television cameras, a remote-controlled manipulator and several recovery devices . . . but no periscope.

Although missions of up to 30 days are considered possible for the NR-1, she normally stays submerged only a few days at a time because of the small living space. There are only three bunks for the seven-man crew — two officers, three enlisted men and two scientists.

The NR-1 cost \$67.5 million to build and oceanographic equipment and sensors costing \$19.9 million were installed. In addition, \$11.8 million was added to the cost for research and development, mostly related to the nuclear propulsion plant designed by the Atomic Energy Commission's Knolls Atomic Power Laboratory.

Plans for the NR-1 were made public on April 18, 1965, when President Lyndon B. Johnson issued a statement that the vehicle was being developed jointly by the Navy and the Atomic Energy Commission. Johnson said that the NR-1 would "contribute greatly to accelerate man's exploration and exploitation of the vast resources of the oceans." He said it would enable scientists to examine firsthand an extensive part of the earth's surface for new sources of raw materials and extend accumulation of commercially useful information on the habits of diverse species of marine life.

Two years later, on June 10, 1967, the NR-1 was laid down at Groton, Conn., where Electric Boat was already building small, battery-powered civilian research submersibles for deep-sea exploration. The largest of these was the 80-ton *Aluminaut*, which was built for a Reynolds Aluminum Co. private venture.

Although larger than the *Aluminaut*, the NR-1 is a small craft by Navy standards. She is only 136 feet 5 inches long, 14 feet 7 inches high, with a beam 12 feet 5 inches. Submerged, she displaces 400 tons.

The NR-1 was launched on Jan. 25, 1969, and was christened by Mrs. Robert W. Morse, wife of a former Assistant Secretary of the Navy. The principal address was given by Robert A. Frosch, an Assistant Secretary of the Navy, who told the audience that the Navy and the world would benefit by the knowledge gained by the NR-1.

Time has proven Frosch right. The NR-1 has been highly successful in her primary mission as a science research vehicle, and she also has proved extremely important in deep-sea engineering, such as maintaining equipment laid on the ocean bottom to detect passing submarines.

In 1977, off the coast of Scotland, the NR-1 was instrumental in locating and recovering a Navy F-14 fighter that had rolled off an aircraft carrier and rested in 2,000 feet of water. The Navy expects that she could accomplish the same work in the event of a lost submarine.

The NR-1 currently operates as a unit of the Submarine Force Atlantic Fleet and is assigned to Submarine Squadron Two. Her home port is New London, Conn.

## Land Systems Completes Study Of Future Combat Vehicles

The final review for the second phase of the Land Systems study of Future Close Combat Vehicle Systems was held recently before a panel of experts in combat vehicle technologies and development. It was held at the U.S. Army Tank-Automotive Command, in Warren, Mich.

Dr. T. K. Sandberg, FCCVS-II Study Program Manager for Land Systems, said Land Systems has been participating in TACOM-sponsored studies of the FCCVS since January 1981 to assist the Army in future planning for combat vehicle development.

The first study (FCCVS-I) looked at combat vehicle technologies that would mature by the year 2000. The Land Systems team integrated selected technologies into a family of five fighting vehicles that would assume the responsibilities of the present main battle tank, the infantry fighting vehicle and the cavalry fighting vehicle.

The genesis for the Land Systems Tank Test Bed vehicle is found in the FCCVS-I Attack Vehicle. FCCVS-I concentrated on the world strategic situation for the United States in the years from 2000 to 2020. A salient feature of this study was the development of a concept of a unique combat group that would allow the Army to meet and defeat the ground combat threats of the year 2020 anywhere in the world.

The study also looked into futuristic technology, including unmanned vehicle operations, artificial visions and automatic target acquisition. The data were used to formulate a family of 10 combat vehicles that could dominate the battlefield of 2020.

Land Systems, as Study Team Leader, was supported by Litton Guidance and Control Division; by Battelle Memorial Institute, Columbus Division, and by Maj. Gen. T. P. Lynch, U.S. Army, Retired. Land Systems study team members in-

cluded Dr. John F. Wohler, Staff Scientist; Joe Yeats, Technical Advisor; Val Daubar, Concept Design; John Posta, Engineering, and John Drew, Computer-aided Design.

## Trident Submarine Under Construction At EB Named Alaska

The Ohio-class Trident missile-firing submarine SSBN 732, now under construction at Electric Boat, has been named *Alaska*.

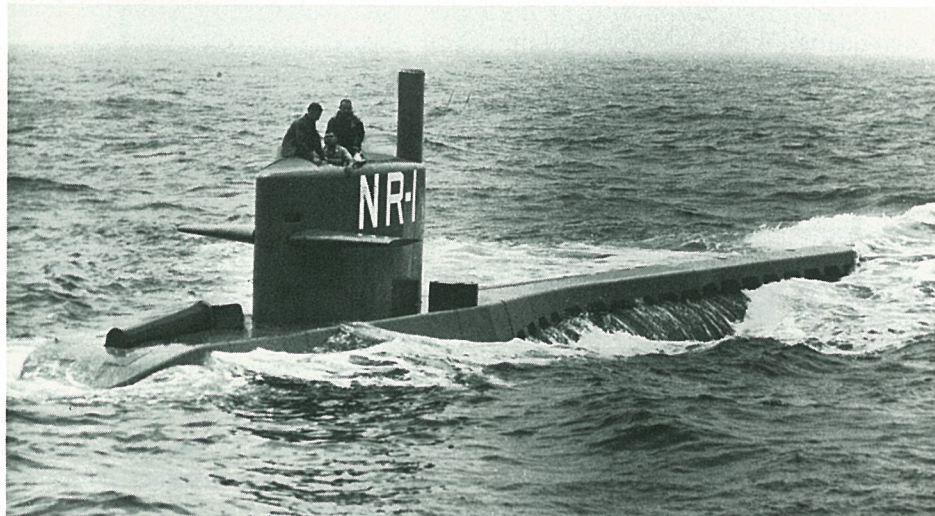
The ship is the first submarine to be named for the 49th state and the fourth Naval vessel to carry that name. The first was a wooden-hulled screw gunboat (1868-1883), which participated in the Korean Expedition of 1871. The second was a fishing boat converted to a minesweeper that served in World War I, and the third was large cruiser CB 1 (1944-47) that earned three battle stars for her service in the Pacific Theater during World War II.

*Alaska*, 550 feet long and displacing 18,750 tons, is the seventh Trident submarine under construction at Electric Boat.

Ships in the class are named for states, an honor formerly accorded battleships. Other states which have a Trident submarine named after them are: Ohio, Michigan, Florida, Georgia, Rhode Island and Alabama.

## Sparrow Contract

The U.S. Navy has awarded Pomona a \$26.5 million contract for production of guidance equipment for the Sparrow AIM/RIM-7M missile. The contract was an add-on to a fiscal year 1982 order that called for production of 690 Sparrow missiles.



*The NR-1 at Sea*





# GD World

This special issue of *GD World* commemorates the launching of the nuclear submarine named in honor of Admiral Hyman G. Rickover, USN (Ret.). Rickover and the Electric Boat Division, the founding division of the General Dynamics Corporation, worked closely together in the development of the USS *Nautilus*, the world's first nuclear-powered submarine. This special issue is dedicated to Cmdr. Eleonore Bednowicz Rickover, USN (Ret.), the admiral's wife, who christened the *Hyman G. Rickover* August 27, 1983.

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*"... I christen thee Hyman G. Rickover..."*

*"In the name of the United States, I christen thee Hyman G. Rickover. May God bless her and all who sail in her. And may God bless their families and loved ones, for they also serve who only stand and wait."*

MRS. ELEONORE BEDNOWICZ RICKOVER  
August 27, 1983

## Electric Boat Launches Submarine Named for Hyman G. Rickover

### Record Crowd Sees Mrs. Rickover Christen Boat at Groton Shipyard

by Jim Reyburn

Saturday, August 27, 1983 belonged to Admiral and Mrs. Hyman George Rickover. For the retired admiral, it was not just a day to add another honor to his list of 13 military medals, 61 civilian awards and 15 honorary degrees. Electric Boat was launching a 688-class fast-attack submarine bearing his name at Groton, Conn.

For his wife, Eleonore, it was a day for a special kind of pride; she was christening the ship named in honor of her husband.

And, for the record 8,500 guests and spectators, it was a chance to catch a glimpse of the legendary "Father of the Nuclear Navy."

"In the name of the United States, I christen thee *Hyman G. Rickover*," said Mrs. Rickover, poised to crack a bottle of California champagne against the striking bar on the bow of the submarine. "May God bless her and all who sail in her." Then she added, "And may God bless their families and loved ones, for they also serve who only stand and wait."

With a well-aimed swing, she smashed the bottle to a chorus of clicking and whirring cameras on a nearby press platform. "Launch!" boomed a voice over the public address system.

At that instant, on the ground, about halfway down the port side of the sleek, 360-foot submarine, Vic Burdick, a retired Electric Boat ship's superintendent, shoved the trigger forward. The *Rickover*, free of all restraints, began her slide into the Thames River. Simultaneously, as the ship's whistle erupted into a deep, throaty roar, the U.S. Coast Guard Band struck up "Anchors Aweigh."

Her crew at attention on the deck, fairwater planes and bridge, the *Rickover* gathered speed down Way #9, burst out of the huge, covered assembly building into a noonday sun and knifed neatly into the river, stern-first.

Beside her, thousands of spectators applauded and cheered, with the sixth Trident ballistic missile submarine, *Alabama*, towering above them on the Land Level Construction Facility.

The crowd watched the ship glide out past the end of the 600-foot facility, slow, then come to a stop as five tugs closed in to nudge her to a berth.

The launching was the culmination of a ceremony full of praise for the 83-year-old Rickover, whose colorful and distinguished 64-year career, which ended with his retirement in January 1982, was the longest in the Navy's history.

"Admiral Rickover's visionary teachings and leadership have set the tone and pace for a wide variety of vital initiatives," Admiral James D. Watkins, Chief of Naval Operations and principal speaker at the ceremony, said. "These initiatives," he continued, "improved the quality of our Navy's overall warfighting capabilities."

Admiral Watkins said he proudly counted himself among those who were students of Admiral Rickover throughout the years Rickover headed the Navy's Nuclear Propulsion Program. "While their backgrounds are different, they share one thing in common. They are all better human beings because he taught them to strive for excellence and not settle for mediocrity."

(The full text of Admiral Watkins' address appears on Page 2.)

Prior to the christening, Mrs. Rickover was introduced by David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, who said:

"You've met a lot of very distinguished people today, but there's no one that is nearly as important to this ceremony as the lady I would now like to introduce.

"She is our sponsor, Cmdr. Eleonore Bednowicz Rickover, U.S. Navy (Ret.), the wife of Admiral Rickover. She served on active duty in the Navy Nurse Corps from 1954 to 1974, when she and the admiral were married.

"She is a native of Chicago, and she attended the St. Mary of Nazareth School of Nursing in Chicago and holds a Bachelor of Science degree in Nursing from Indiana University. Mrs. Rickover is a member of the Women's Board of the St. Mary of Nazareth Hospital Center in Chicago. She is also a member of the Board of Hospice of Northern Virginia.

"We are very grateful to Mrs. Rickover for joining us today as the first lady of this memorable occasion, and I hope you all welcome our sponsor, truly the most important person here for this ceremony, Eleonore Rickover."

Lewis set the laudatory tone of the occasion in his remarks made earlier. "While all Americans are fully aware of the great contributions Admiral Rickover has made to the security of this country through his direction and leadership of the Navy's nuclear ship programs," Lewis said, "the people of Electric Boat know that this great shipyard and the number of jobs it provides would be small indeed had it not been for his dedication and determination to see to it that the promise of the nuclear submarine became a reality. We are all here to pay our respects to this great man."

Included in that "all" was an impressive list of dignitaries who were introduced during welcoming remarks by Fritz Tovar, Electric Boat Vice President-General Manager. They were: Admiral Kinnaid R. McKee, Director of the Naval Nuclear Propulsion Program and Admiral Rickover's successor; Admiral Steven A. White, Chief of Naval Material; Dr. Shelby Brewer, Assistant Secretary for Nuclear Energy of the Department of Energy; Walter T. Skallerup, Jr., General Counsel of the Navy, and Vice Admiral Earl B. Fowler, Jr., Commander, Naval Sea Systems Command.

Also, Vice Admiral Nils R. Thunman, Deputy Chief of Naval Operations for Submarine Warfare; Vice Admiral Bernard Kauderer, Commander, Submarine Force, U.S. Atlantic Fleet; Victor Gilinsky, Commissioner of the Nuclear Regulatory Commission, and Rear Admiral Austin B. Scott, Commander Submarine Force, U.S. Pacific Fleet.

In the audience were many of Admiral Rickover's former associates who had worked closely with him on the development of the nuclear submarine program.

Captain Richard Kukler, a Navy chaplain, blessed the ship in time-honored fashion. He called the *Rickover* "an awesome marvel of man's technology and creativeness. It symbolizes man's strength, his power and his security. Through it he seeks to make safe his own rights as that of all mankind to life and to liberty and to happiness."

Before the blessing, the guest of honor added a dash of lightheartedness to the event. Although Admiral Rickover had elected not to speak at the ceremony, just after the introduction of Mrs. Rickover, he leaned over and kissed her. Then, stepping jauntily to the podium microphone, he quipped: "That wasn't in the program."

Later, he gazed proudly at her as she christened the submarine bearing his name. It was obviously their day — one they wouldn't soon forget.



# Admiral Watkins Praises Rickover as Man of Courage and Vision

Following is the complete text of the remarks made by Admiral James D. Watkins, Chief of Naval Operations, at the launching of the nuclear submarine Hyman G. Rickover at Groton, Conn., on Aug. 27, 1983:

On this special day, I would like to share with you a story of an ancient philosopher who came to a city, determined to save its inhabitants from sin and wickedness. Night and day the philosopher walked streets and haunted marketplaces. He preached against greed and envy, against falsehood and indifference. At first people listened and smiled. Later they turned away, for he no longer amused them. Finally, a child asked, "Why do you go on? Do you not see it is hopeless?"

The man answered, "In the beginning, I thought I would change men. If I still shout, it is to prevent men from changing me." This is a story that Admiral Rickover tells — and has used in many speeches. It is the timeless story of a visionary man who perseveres, who does what he knows is right; a story of a teacher, who desires to impart his knowledge to others; a story of courage, the search for excellence, the use of every skill and God-given capability that one man possesses. It is also the Admiral Rickover story.

I speak from personal experience, for I am one of his students. And there are others here today who have come to share the honor of observing this historical event. Military and civilian — active duty and retired — these students of Admiral Rickover come from the ranks of the former Atomic Energy Commission, Naval Reactors Directorate, both houses of Congress, and from the nation's scientific and engineering communities. While their backgrounds are varied, they share one thing in common — they are all better human beings because he taught them to strive for excellence and not settle for mediocrity. They know, because he taught them, that intellectual integrity, technical honesty, sound analysis, and courageous decisions are essential ingredients in managing the development of technology.

These are the qualities often overlooked by the sensationalist or gossip who watches the Admiral from afar — who has no direct linkage; who speaks of personal-interview folklore; who feeds on and reproduces rumor ever more exaggerated with each one-sided source input. These people miss the mark. They do not begin to understand the depth of this brilliant American, his dedication to American ideals, his quest for excellence in himself and others, his undaunted spirit.

Even biographical summaries found in the libraries of the world only tell part of the Admiral Rickover story. While properly crediting Admiral Rickover as the Father of the Nuclear Submarine, these accounts still miss the mark. An engineer, educator, patriot and critic, Admiral Rickover's range of interests and knowledgeable teachings have run from conservation of our natural resources to the study of ethics and morality.

## Must Reach For Infinite

Admiral Rickover has said that "One must learn to reach out, not to struggle for that which is just beyond, but to grasp at results which seem almost infinite."

Reaching for the infinite — that aptly describes much of Admiral Rickover's work as a teacher. Thirty years ago, the Admiral reached for the infinite when he envisioned the warfighting potential of the nuclear submarine. Because of his perseverance, and despite many others who were doubting and narrow in vision, our Navy is the world's foremost source of knowledge in design, construction and safe, efficient operation of nuclear power plants.

Last month I had the chance to visit USS *Nautilus*, now readied at Mare Island Naval Shipyard for delivery to her memorial home here in Groton. As I walked through that submarine, I was reminded of how revolutionary she was back in 1954. With *Nautilus*, we slipped the confines of having to surface frequently to recharge our batteries and refresh our air supply. We were able to stay submerged and run at high speeds almost indefinitely. That marked a watershed in submarine development and the beginning of a revolution in strategy and tactics. USS *Nautilus* was the first true submarine.

This success story goes back even further, to the 1940s when few were enthusiastic about nuclear power and many thought it outright impossible. So it took a visionary to circumvent the ever-present naysayers and get this program going. Against all odds, Admiral Rickover proved that nuclear power could be safely used, both in shipboard propulsion and civilian power-generation applications.

Admiral Rickover knew that investments in proper design, quality control in manufacturing and excellence in training were prerequisites for safety and success. He recognized that if you pay now for quality assurance and environmental protection, you avoid paying later in potential environmental damage, tragic loss of life and prohibitive remedial costs. While others looked for shortcuts, Admiral Rickover insisted upon establishing his standards of performance — with checks and balances, concern and quality, and extra care that have become the hallmark of our Navy's nuclear power program.

## Concerned With Radiation Safety

From the very beginning, Admiral Rickover was particularly concerned about safety — it was a fundamental consideration in every facet of his program. The Admiral has testified repeatedly, "Where radiation is involved, we are dealing not just with the lives of present-day individuals, but with the genetic future of mankind." From the beginning he designed each nuclear ship with the thought that his own son would be a member of the crew.

Long before environmental impact statements were even thought of, Admiral Rickover was concerned about man's ability to properly use new technologies, hailed as advancements, and what long-range effect they might have on our environment.

The teacher also knew that the vital link in any technological advancement was the human element — could people be trained to safely operate and use what scientists and engineers produced?

Many others failed to understand what Admiral Rickover already knew — it is the quality of people that makes the difference. An engineering system could be designed perfectly, but still it could be made to fail, if those required to operate it did not understand and respect every theoretical and practical aspect of what they were doing.

Because the Admiral understood human significance in the equation, he did not produce technocrats alone. Instead he developed the Navy's nuclear power program around a solid core of dedicated individuals who showed the same care, understanding and quest for excellence. The crew that stands aboard the ship we launch today is a legacy of that philosophy.

This philosophy led the Admiral's searching mind to question the very capability of our national education system to give him the raw material he needed to successfully operate the nuclear power program. When he saw just how weak our nation's educa-

tional standards were, he put his energy and drive toward correcting the discovered inadequacies. Not only did he build his own schools and trainers in the Navy to do what had to be done, he embarked on a one-man campaign to improve the educational system throughout the country.

Let me quote Admiral Rickover: We need "to develop to the utmost our human resources — the minds of our young people. They will need far more highly trained minds than the ones we now get by with in order to cope with the poorer and more crowded world we are bequeathing to them."

## Proper Education A Driving Motivation

That was written by the Admiral over twenty years ago. Yet it still encapsulates a driving motivation in his life which may well surpass all others in intensity — the proper education and training of our young people.

Admiral Rickover also wanted each of his students to make full use of God-given talents to do the job right. He knew that all too often the mediocre and status quo were the world's standards of performance — not the exceptional and the excellent. He acknowledged that success was only possible with hard work and heavy sweat, reminding his students that the hard-fought is the sweetest victory of all.

Individual responsibility for excellence is a central philosophy of his life. He incorporated this belief into the very organization of the Naval Reactors Directorate which he founded. When the best of the Navy — and government — were rushing off to reorganize and build large bureaucracies, he fenced off his own organization to insure against obfuscation of individual responsibility and accountability. He has always been fully accountable for his actions, first and foremost, to himself — the toughest judge of all.

He also championed the cause of not cheating the taxpayer out of his tax dollar, long before "fraud, waste and abuse" became Washington buzz-words. He was concerned not only with blatant subterfuge and outright evasion of the law by industry, appointed officials and government employees, but also with attempts to circumvent established practices of responsible behavior. He did not subscribe to the Roman maxim *caveat emptor*, let the buyer beware, but believed that everyone had a moral and ethical responsibility to provide a quality product — whether it was a piece of equipment from a manufacturer or the day-to-day performance of an employee, nobody should cheat the taxpayer.

## Many Doctrines Now Accepted Standards

Admiral Rickover's visionary teachings and leadership have set tone and pace for a wide variety of vital initiatives, which improved the quality of our Navy's overall warfighting capabilities. Many of the Admiral's doctrines, first strongly opposed, are now accepted standards throughout the Navy. Why? Because they work and they're the right thing to do.

The legacy of superb performance continues today. Since *Nautilus* first put to sea in 1955, our nuclear-powered ships have steamed over 55 million miles and have accumulated over 2,600 reactor-years of operation. Further, in the 30 years since the *Nautilus* land prototype first operated — and with 127 nuclear submarines, 4 nuclear carriers, 9 nuclear cruisers, a total of 170 reactors in operation today — there has never been an accident involving a nuclear reactor, nor has there been any release of radioactivity which has had a significant effect on our environment. To date, almost 60 thousand officers and enlisted men have been trained in this program, all striving to meet that Rickover mark of personal excellence.

The Admiral often talks about the proper utilization of our limited national resources — human, financial and natural. It is appropriate then, to name this submarine after the Admiral, for his teachings of properly using our resources to the fullest are embodied in this submarine and her sisters. This is today's most quiet — most "stealthy" — most sophisticated submarine; this submarine is the result of applied knowledge, which produced solid, well-designed and tested engineering systems; this submarine has the Admiral's concern for system reliability, redundancy and simplicity, built in as standard equipment, not as options, and the crew of this submarine will reflect the Admiral's reliance upon well-trained people who use their full potential.

This submarine and the fine crew that will take her to sea are symbolic of a much larger group of submarines that already bear that unique mark of Rickover excellence. They will be the principal determinant of victory during any protracted war at sea.

It is difficult to properly honor Admiral Rickover for what he has accomplished. This same problem confronted the Admiral's headquarters staff at Naval Reactors. They wondered, "What type of recognition do you give a man whose service performance has transcended all others? How do you honor a man after 64 years of active duty service who already has 15 honorary degrees? Who has won over 60 different awards, including a Presidential Medal of Freedom and a Congressional Gold Medal?"

## Loyal, Committed, Compassionate Staff

What you give him is a special, very personal gift that shows your respect for the man. To do that, they chose to support Eleonore Rickover's work as a member of the Board of Hospice of Northern Virginia. Eleonore, our lovely sponsor, is not only a hospice board member, but is also an active volunteer, caring for the terminally ill in the hospice as well as in their own homes. The staff raised over five thousand dollars for the hospice. This loyalty, commitment and compassion in his staff tells more about Admiral Rickover and his life's accomplishments than any other biographical footnote. This honors him and his wife better than any other type of special award or recognition.

It is an "Admiral Rickover Story" such as this, which best tells about the man and his life. This is a story about undaunted spirit, Diogenes-like intellect, an untiring man who is seeking excellence and takes individual responsibility for each and every action. It is the story of a patriot; the story of a winner who values the proper development and education of our young people, because he knows that each American can only be a full partner in citizenship, if he or she has the knowledge and determination to seek such a relationship. That is the real Admiral H. G. Rickover this new submarine represents.

So this is an important day, not only for Admiral and Mrs. Rickover, not only for our nation and Navy, but for the many students of the teacher who have come to know the true Admiral Rickover story — and this submarine will serve as a constant reminder of that story.

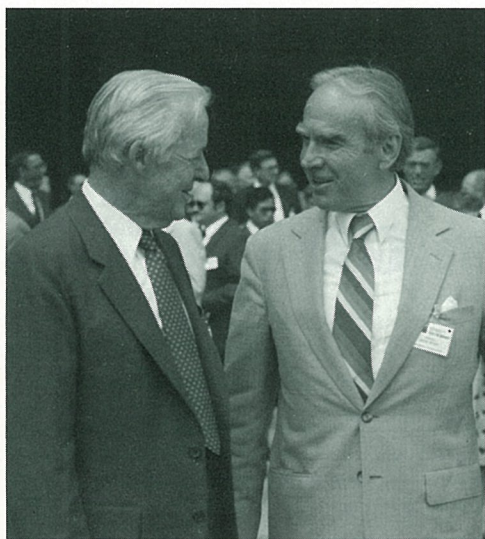
It was the Admiral's demanding leadership; his technical wisdom and engineering foresight; his frank and knowledgeable discussions with our nation's elected leaders; and his consuming pursuit of and strict adherence to standards of excellence, that has given this nation a nuclear navy second to none. Without this man's contributions, *Nautilus'* famous "Underway on Nuclear Power" would probably still be an unfulfilled Jules Verne vision.

Thank you and God bless you all for coming today and helping this talented Navy crew take the initial step, on their long journey, into the deep.



Admiral James D. Watkins





**Dignitaries Attend.** Venezuelan, United States and General Dynamics officials were on hand for the official delivery of the first F-16 to the Venezuelan Air Force. In photo at left, Col. Robert Ettinger, Deputy for F-16 Systems Program Office (at left), formally turns over the delivery paperwork to Maj. Gen. Carlos Pinaud, Commander of the Venezuelan Air Force. In center photo, David S. Lewis, Chair-

man and Chief Executive Officer of General Dynamics (at left), talks with House Majority Leader Jim Wright, Democrat from Texas. In right photo, Marcial Perez, Ambassador to the United States from Venezuela (at left) looks over the cockpit of the Venezuelan F-16 with Herbert F. Rogers, Vice President and Fort Worth General Manager (center), and Dave Palmer, Fort Worth's Chief Test Pilot.

## New Multiyear Award Funding For 480 F-16s

General Dynamics has received additional funding of \$552 million under a multiyear contract with the U.S. Air Force for the production of 480 or more F-16 fighter aircraft.

The fixed-price incentive contract is valued at more than \$2.6 billion, with the award bringing the total funding obligated to date to \$1.65 billion. It completes funding for 240 F-16s authorized for Fiscal Years 1982 and 1983 and provides long-lead funding associated with the F-16s for Fiscal Years 1984 and 1985. Production deliveries under this contract will continue through mid-1987.

F-16s for foreign countries are covered by a separate multiyear contract which currently provides for 234 aircraft as ordered by Egypt (80), Korea (36), the Netherlands (54), Pakistan (40) and Venezuela (24). It is expected that orders for additional F-16s announced by the Government of Israel in August and other new orders by foreign countries will be added to this contract.

General Dynamics has delivered more than 1,030 F-16s to the air forces of the U.S. and seven other countries since the start of full-scale production in late 1977.

## Trident Submarine Will be Named for Henry M. Jackson

President Reagan has announced that the fifth nuclear-powered Trident ballistic missile submarine will be named the USS *Henry M. Jackson* in honor of the late Senator Henry Martin Jackson of Washington.

Senator Jackson, who died September 1st, was elected to the House of Representatives in 1940 and to the Senate in 1952.

"During his unique career of national leadership, he was a bi-partisan champion of personal freedoms and of a strong national defense. One of his many legislative accomplishments was serving as principal Congressional advocate and sponsor of the Trident submarine program," the President said.

The *Henry M. Jackson* (SSBN 730), fifth ship of the *Ohio* class, will be 560 feet long, 42 feet wide and will displace approximately 18,700 tons when submerged. She will carry 24 Trident I ballistic missiles, along with Mark 48 torpedoes.

SSBN 730 originally was designated the USS *Rhode Island*. The Navy said it now intends to name the *Los Angeles*-class nuclear attack submarine SSN 719 USS *Providence* in honor of the capital city of Rhode Island.

The *Henry M. Jackson* will be launched by Electric Boat on October 15th at Groton and will join the Pacific Fleet in 1985. She will be home-ported at Bangor in Senator Jackson's home state of Washington.

## Ceremony Marks Delivery of First F-16 for Venezuelan Air Force

The first F-16 for the Venezuelan Air Force was formally delivered in ceremonies at Fort Worth September 9th.

Maj. Gen. Carlos Pinaud, Commander of the Venezuelan Air Force, officially accepted the aircraft from Col. Robert Ettinger, Deputy for F-16 System Program Office.

The South American nation is to receive six F-16 multimission fighters later this year, and an additional 18 are scheduled for delivery by the end of 1985.

During the rollout ceremony, Gen. Pinaud said, "Today is a very important day for Venezuela. When I was here three years ago, being able to obtain the F-16 for our Air Force was just a dream. Now that dream has been fulfilled.

"This is a joyful day for the Venezuelan Air Force, and it is profoundly significant for the defense of our country."

House Majority Leader Jim Wright, Democrat from Texas, who also spoke at the ceremony, said, "Let all the world know that the purpose of this defensive fleet of F-16 aircraft, in the hands of an enlightened and democratic people, is not to spread hate and destruction, but to build a dependable defense for the ongoing works of peace to which the Venezuelan nation is committed.

"And let all the world know what we celebrate here today is a secure and growing friendship between our two nations and our people, based upon equality and upon mutual determination to preserve and defend freedom and local self-rule for the people of our hemisphere and to persist by deeds as well as words in the determined quest for peace on earth."

Brig. Gen. Thomas Baker, Director of International Programs for the U.S. Air Force, said, "Introduction of the F-16 into the Venezuelan Air Force marks a significant security initiative by the United States into the southern hemisphere.

"This reinforces our common bond, and

it is a bond that will remain vibrant for years to come."

Marcial Perez, Ambassador to the United States from Venezuela, noted that "This is the end of one process and the beginning of a new one. Today we are receiving a new system of defense for our country.

"Introduction of the F-16 represents a formidable investment for our defense, and this ceremony is of historic importance to us."

The delivery ceremony marked an "important occasion to our two nations and to our company," added David S. Lewis, Chairman and Chief Executive Officer.

He pointed out that Venezuela, like other nations now flying the F-16, received its first aircraft ahead of schedule and under the projected cost.

Lewis also praised "those who designed and built the F-16. You represent one of the world's finest industrial teams . . . you really are an outstanding industrial team."

Herb Rogers, Vice President and Fort Worth General Manager, had praise for the Venezuelan technicians and pilots who are in the United States undergoing training so they can service and fly the Falcon.

"Our instructors say these young men and women are among the most proficient students that we have had."

He added, "And we have heard many good things said about the pilots at Luke AFB in Arizona.

"I am happy to say that from the very beginning, the program has gone extremely well and we at General Dynamics are looking to a long and successful association with the people of Venezuela on this program."

A Venezuelan F-16 was on static display in the hangar in which the ceremony was held. Following the ceremony, two other Venezuelan F-16s were flown to demonstrate the acceleration and maneuverability of the aircraft.



**Acceptance Ceremony.** A camouflaged Venezuelan Air Force F-16 was the centerpiece during ceremonies at Fort Worth in which the first of 24 Falcons ordered by Venezuela was formally turned over by the U.S. Air Force.

## Turkey Selects F-16 as Main Defense Plane

The Defense Ministry of the Republic of Turkey on September 8th announced that the F-16C/D has been selected as the main defensive aircraft for the Turkish Air Force.

A statement released by the Turkish Defense Ministry said:

"The studies which have been continuing for a long time on the Air Force modernization have been concluded and the Turkish Government officially notified the American Administration on 6 September 1983 on the joint assembly and manufacturing of the F-16C/D interceptor-bomber aircraft through Turkish-American cooperation.

"Contracts and studies on the subject are expected to continue for three months."

In Fort Worth, Herb Rogers, Vice President and General Manager, said, "We are extremely pleased that the Republic of Turkey has selected the F-16 Falcon to serve as its top-of-the-line fighter aircraft for the Turkish Air Force."

Turkey will become the sixth NATO country to operate the multimission aircraft and the 11th in the Free World.

"Winning this competition is a very important event for General Dynamics and the F-16 program," Rogers said. "It represents an order for 160 aircraft which will be delivered in the 1987-1994 time period — thus helping to assure a long, stable production base."

This will be a Foreign Military Sales program, Rogers said, "and, as such, requires a contract to be signed between the U.S. Government and the Government of Turkey. That will take the remainder of this year. Full go-ahead is expected in January 1984 on the program.

"I congratulate those employees who have worked long and hard over the past three years on the Turkish program. I also would like to thank all of you for continuing to make the F-16 the low cost high-quality product that it is — for that continues to be the most important to our future success."

## New Design Office Opened in Atlanta

A new engineering design office, with initial job assignments in support of Electric Boat, has been opened in Atlanta, Ga.

The new office, which will have a population of more than 200 engineers and draftsmen in a variety of disciplines, is being equipped with the latest in information processing systems.

The decision to open the new office followed an intensive survey of Atlanta, where there was an immediate availability of qualified technical personnel with engineering and drafting skills.



# Around the World... ...in GD

**CHQ:** Robert H. Trice joined as Corporate Manager-International Business Planning . . . James D. Hoffman joined as Supervising Senior Auditor . . . Carey J. Riley transferred from Convair and was promoted to Corporate Manager-Cruise Missile Systems . . . Sue L. Shike to Corporate Manager-College Relations . . . Regina Wischmeyer to Corporate Manager-Electronic Mail/Office Systems . . . Alvin E. Brown to Corporate Contract Specialist . . . W. Ray Crain to Corporate Director-Government Contract Settlement . . . Robert E. Dupuis to Corporate Pricing Specialist . . . S. Lane Lambert, III to Manager-Internal Audit/EDP . . . George A. Rettig to Deputy Director-Internal Audit . . . Sharon L. Boni to Supervising Senior to Corporate Office Systems Trainer-EM/OS.

**Fort Worth:** D. G. Alley and C. N. Main were promoted to Logistics Group Engineer . . . J. L. Bean, III to Senior Program Analyst . . . G. Blood to Material Stores Supervisor . . . D. H. Briles and H. H. Devenish, Jr. to Logistics Administrative Representative . . . J. R. Brooks, G. C. Conrad and R. B. Kendall to General Foreman . . . B. C. Cornelius to Industrial Engineering Specialist . . . W. P. Cromie to Field Service Engineer . . . R. A. Doyle to Chief of Administrative Services . . . V. E. Gurule to Director-F-16 International Co-Production . . . R. E. Kidd to Production Management Specialist . . . L. D. King and M. R. McConaghy to Senior Cost Reduction Analyst . . . R. B. Leighton and T. A. Riley to Material Cost Coordinator . . . B. W. Lytle to Project Manufacturing Support Equipment Engineer . . . R. P. Andrews, J. W. Nunn and F. P. Kirkland to Engineering Program Manager . . . W. K. Bailey and S. K. Jackson, Jr. to Chief Project Engineer . . . J. W. Baird, B. J. Perrin and R. D. Pointer to Purchasing Agent . . . W. P. Cahill to Engineering Manager . . . J. W. Carr and E. J. Nation, Jr. to Inspection Supervisor . . . P. J. Carter and P. L. Schwab to Program Specialist . . . D. A. Cunningham and J. E. Holden to Chief of Industrial Relations . . . H. F. Davis to Director of Material Financial Management . . . B. R. Erwin, M. A. Grayson, T. D. Roberts and D. M. Wheeler to Assistant Project Engineer . . . P. O. Gallagher to Chief of Procurement . . . J. P. Guthrie to Financial Supervisor . . . R. J. Ingram to Chief of Material Receiving & Disbursement . . . J. O. Karnes to Quality Assurance Engineering Specialist . . . E. E. Kerlin and D. Lobrecht, Jr. to Project Engineer . . . R. T. Parks to Manager of Control . . . R. O. Roberts to Chief of Quality Assurance . . . J. V. Sabin to Engineering Chief . . . K. R. Sartor to Manager of Material Estimating . . . D. K. Shubert, Jr. to Material Planning Supervisor . . . R. I. Vanhooser to Industrial Engineer . . . R. A. McCormick to Senior Logistics Administrative Analyst . . . J. S. Miller to Administrative Service Representative . . . L. K. Norris, R. M. Hatch and G. M. Trammell to Logistics Engineer . . . R. K. Press to Traffic Foreman . . . A. M. Quincoses to Senior Facility Engineer . . . S. L. Stripling to Industrial Relations Representative . . . W. A. Wolf to Logistics Specialist . . . T. R. Boley, Jr. to Chief of Contract Administration.

**Pomona:** Lew O. Blum to Superintendent . . . Sarah J. Cagle and James L. Miller to Material Control Supervisor . . . Leroy H. Caldwell and David W. Holmes to Manufacturing Supervisor . . . James E. Caudill to Logistics Project Engineer . . . Maureen A. Bush, Karen S. Rimer and John F. Sullivan to Project Coordinator . . . Robert D. Hudson to Accounting Supervisor . . . Bonnie I. Hunt to Manager-Quality Circles . . . William H. Jenkins to Engineering Section Supervisor . . . Roger L. Johnson, Gail R. Mulholland, William H. Pansing, Anthony J. Seibert and David E. Stephens to Section Head . . . Robert E. Karlson to Senior Project Engineer . . . Allen G. Kong to Senior Quality Engineer . . . Vernon D. Like to Factory Manager . . . Donald J. Lynch to Chief Engineering & Technical Director-RAM . . . Michael C. Martin and Edward Miyashiro to Development Project Engineer . . . George A. Melendez, Gloria J. Good and Thomas G. Drake to Quality Assurance Specialist . . . Gene L. Parker to Quality Assurance Group Engineer . . . Frank V. Pirolo, William I. Fifer and Stephen J. Pipher to Engineering Manager . . . Susan K. Pixley and Diamond C. Verna to Senior Quality Assurance Specialist . . . Orville K. Owen, Lynn C. Cantwell and Raymond A. Ellestad to Group Engineer . . . Herbert C. Macy to Engineering Specialist . . . Nancy J. Hartman to Senior Cost Control Analyst . . . David D. Coburn to Engineering Group Supervisor . . . Robert S. Coder to Contract Specialist . . . Joel S. McInnis to Project Administrator . . . James E. Schneider to Senior Manufacturing Engineer . . . John A. Phelps to Chief Inspection . . . Diane T. Kelber to Chief Manufacturing & Material Control . . . James H. Thomas to Manager-Manufacturing & Material Control . . . At Camden, Sheila M. Fitzpatrick to Senior Accounting Specialist . . . Lawrence P. Smith to Chief Production Support . . . Loretta G. Newton to General Supervisor . . . Gary D. Poff to Group Engineer.

**Convair:** Raymond D. Jones transferred from Corporate and was promoted to Program Administrative Chief-Advanced Space Programs . . . Michael J. Paesani was promoted to Operation Supervisor-Manufacturing.

**Electric Boat:** Mark Newgarden was promoted to Laborer General Foreman . . . Raymond Panciera to General Foreman-Reactor Plant Service . . . James Sposato to Foreman.

**Electronics:** D. L. Sturek was promoted to Director of Simulation & Training . . . G. R. Goddard, Jr. to Program Manager . . . A. D. Christie, H. L. Copeland, K. C. Bonine, D. M. Borkenhagen, A. Maestas and R. J. Brennan to Section Head-Engineering . . . D. J. Kokel to Engineering Manager . . . B. Burchette, R. C. Barker, Gene C. Fischer, and R. Britton to Senior Engineering Specialist . . . R. L. Williams to Special Project Administrator . . . W. A. Owens to Section Head-Operations . . . J. J. Vandenberg to Product Test Supervisor . . . Jay J. Glucksman to Financial Specialist . . . Sandy Gubala to Quality Control Engineer . . . Bev A. Kuver to Logistics Program Coordinator . . . Fred Nordstrom to Senior Management Systems Analyst . . . Fred L. Olsen to Product Test Engineering Specialist.

**Land Systems:** C. J. Ahern, B. C. Boesser, Jr., A. E. Cote, L. M. Gerger, C. J. Hatton III, E. T. Hayes, Jr., M. A. Kelly, K. V. Lask, G. A. Lesnau, H. F. Levine, N. G. McDonald, R. K. Muir, R. J. Thompson, G. C. Weber and P. W. Wheeler were promoted to Engineering Supervisor . . . T. G. Bander and K. L. Smith to Senior Supervisor-Office Services . . . D. L. Darios to Manager-Office Services

## Electronics Awarded Major B-1B Avionics Test Equipment Contract

Electronics Division has been awarded a major subcontract valued at approximately \$100 million for the development and production of automatic test equipment for the B-1B strategic bomber.

Announcement of the award was made by Rockwell International Corporation's North American Aircraft operations, prime contractor for the B-1B.

The test equipment, which consists of multiple test stations, each with its own minicomputer, will be used for off-aircraft

testing for 162 complex electronic avionics Line Replaceable Units for the bomber.

The contract calls for the development of operating software for each test station along with a program development station which will be used by programmers in the preparation, editing and debugging of test programs.

In announcing the award to an assembly of Electronics workers, F. F. Jenny, Vice President and General Manager, said that this was one of the largest competitive test equipment contracts ever awarded.

"This is a major win for Electronics, and it has been a total team effort," he said. "We have to thank all of the people who worked on the outstanding proposal and the technical backup to it. Now we have to translate the proposal to hardware and make the delivery dates on this vital program."

Terms of the contract call for delivery of the first hardware program development station during March 1984 followed by preproduction hardware in July 1984. The contract will continue through mid-1988. The first Strategic Air Command base is slated to receive test hardware during mid-1986.

## Felder Named Land Systems Vice President

Louis F. Felder has been appointed Division Vice President and Program Director-M1 at Land Systems.



Felder

Formerly M1 Program Manager, Felder continues to be responsible for meeting cost, schedule and performance objectives of the M1 program, as well as all aspects of M1 production and product improvement programs. He reports to R. W. Truxell, Vice President and General Manager.

Felder holds a Bachelor of Science degree from the University of Maryland and a Master of Business Administration degree from George Washington University. He joined the Chrysler Defense Group in 1973 after serving for 30 years in the U.S. Army.

## GD World

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Manager of Internal Communication  
Edward D. Williams

## Savings and Stock Investment Values

Salaried	July 1981	July 1982	July 1983
Government Bonds	\$ 2.6184	\$ 3.0351	\$ 3.4788
Diversified Portfolio	2.1407	1.8749	3.1727
Fixed Income	1.2274	1.3659	1.5295
Hourly			
Government Bonds	2.6154	3.0325	3.4768
Diversified Portfolio	2.1875	1.9129	3.2385
GD Stock	\$28.7500	\$29.5000	\$53.6250

. . . R. G. Diaz, G. E. Platzer, Jr., T. K. Sandberg and M. S. Sokoloski to Principal Engineer . . . F. G. Dickman to Graphic Arts Chief . . . J. B. Edwards to Material Finance Chief . . . C. L. Elmers to Administrator Chief . . . C. R. Erb, S. Kumar, J. D. O'Rourke and J. G. Petty to Engineering Chief . . . P. R. Grannan, D. A. Sadders and M. Urbanczyk to Material Planning Supervisor . . . C. J. McClary, L. J. Starczewski and K. S. Tonkavich to Office Services Supervisor . . . J. E. Morton to Guard Captain . . . M. B. Peri to Senior Supervisor-Reproduction Services . . . R. K. Pietsch to General Foreman.

**Quincy:** Carl Wallace was promoted to Manager of Compensation & Benefits . . . David VanSchagen to Manager of Purchasing . . . Joseph Thompson to Senior Cost Analyst . . . Harold Swanson to Electrical Engineering Supervisor . . . Fred Sussman to Assistant Director of Industrial Relations . . . Bruce Pinel to Welding Engineering Supervisor . . . Mario Martins to Chief of Graphic Services . . . William Locke to General Superintendent-Utilities Conservation . . . William Beauregard to Program Manager-Fulton . . . Linda Honneus to Compensation & Benefits Analyst . . . Donald Gendreau, Michael Fitzgibbon, Dan Aepelbacher, James Hilton, Jr., James Williams, Robert Shea and Russell Gore to Shipfitting Foreman . . . Arthur Montrond, Frederick Edgar, Brian Crafts, Richard Biagiotti and Edward Macedo, Jr. to Operations Foreman . . . John Callinan to Chipping & Burning Foreman . . . Scott Parsons and Paul Keenan to Welding Foreman.

**DS:** At Home Office, William E. Tucker joined as Computer Systems Specialist . . . Mel Indyk was promoted to Manager-Network Systems . . . Dennis R. Nack transferred from Western Center and was promoted to Software Engineering Specialist . . . Douglas A. Ross transferred from Eastern Center and was promoted to Computer Systems Specialist . . . At Eastern Center, Robert M. Genest was promoted to Supervisor-Operations Services . . . William C. Evans to Site Manager . . . At Central Center, Mary Atkins and William R. Widmer were promoted to Chief-Computer-Aided Design . . . Kirby L. Boyd and Harvey D. Golden to Supervisor-Engineering Software . . . John F. Kenney, Leland R. Park and Roy Schemensky to Chief-Engineering Software . . . At Western Center, LaMoyne M. Biss was promoted to Supervisor-Business Systems Development . . . James W. Cain, Robert C. Foster and Diana M. Watson to Supervisor-Engineering Software . . . Len A. Cocking and James E. Meyer to Chief, Engineering Software . . . Ellen Ferrone to Supervisor-Operations Services . . . Oliver L. Harris to Site Manager (Convair).

**Datagraphix:** H. S. Millum was promoted to Material Operations Manager . . . R. H. Burg to Manufacturing Engineering Supervisor . . . G. A. Hofer to Support Engineering Manager . . . R. L. Russ to Drafting Supervisor.

**Services Company:** T. J. Peters was promoted to Quality Control Engineer . . . J. G. Cono to Chief of Procurement.



# Letters, Wires Congratulate Adm. Rickover

Former President Jimmy Carter was one of a number of prominent Americans who sent congratulatory messages to Admiral Hyman G. Rickover at the launching of the submarine named in the admiral's honor.

Former President Carter sent a letter, dated Aug. 27th, which said:

"Rosalynn and I are pleased to congratulate you on the great and deserved honor you are receiving today. It is a fitting testimony to your leadership that the *Hyman G. Rickover* (SSN 709) sail as a proud reminder to all of us who have been so influenced by you.

"America is fortunate to have this monument signifying the inspiration you have provided in years past and for years to come."

Among other messages were telegrams from Senator Strom Thurmond, Republican from South Carolina and President Pro Tempore of the Senate, and Representative Melvin Price, Democrat from Illinois and Chairman of the House Committee on Armed Services.

\* \* \*

Senator Thurmond said:

"Unfortunately, a schedule conflict prevents me from attending the launching ceremony of the *Hyman G. Rickover* (SSN 709).

"However, I am pleased to join the many distinguished guests gathered today in offering my congratulations and personal thanks to a man who has turned opportunity into achievement, an innovative genius and a great American, my good friend, Hyman G. Rickover. It is appropriate that this magnificent vessel be named for Admiral Rickover, for his contributions as Father of the Nuclear Navy will be forever remembered in American History.

"As one of the Navy's greatest assets, Admiral Rickover's pioneering spirit catapulted the Navy into a new era of technology — an era which has allowed the United States to maintain a stronger defense posture.

"Admiral, I salute you for your outstanding accomplishments, and today's ceremony is just one way in which the U.S. Navy, and the entire country, can express its deepest gratitude to you. God bless you, and may this ship serve America as long and as effectively as you have. Best wishes to everyone on this special occasion."

\* \* \*

Representative Price's wire read:

"On behalf of the House Committee on Armed Services, I convey best wishes and congratulations on the occasion of the launching of the nuclear submarine named after you.

"No one is more deserving of this single honor which the grateful citizens of our nation have bestowed upon you.

"We thank you for your brilliant and dedicated efforts in bringing into being and developing a nuclear powered Navy that provides our nation with its first line of defense and security."

\* \* \*

Among the other messages from military, government and civilian sectors was a letter from retired Senator John O. Pastore, now Chairman of the Columbus National Bank of Rhode Island, who wrote:

"I cannot allow this occasion to pass without expressing my regret and disappointment at not being able to be with you at the launching of the *Hyman G. Rickover* SSN 709.

"As a member of the Joint Committee of the Congress on Atomic Energy for 24 years, and, from time to time, its Chairman, I came to know Admiral Rickover and have always admired him for his devotion and dedication to duty and, if I may say so, his guts for carrying out what he believed to be right.

"I congratulate General Dynamics Corporation for this deserved honor to a great man whose inspiration and genius gave us our nuclear Navy."

## Navy Wives' Importance Emphasized by Mrs. Rickover

Mrs. Eleonore Bednowicz Rickover, sponsor for the *Hyman G. Rickover*, said she added words to the traditional christening as her salute to Navy wives and families.

Of Navy wives, she said, "They also serve who only stand and wait," words taken from John Milton's sonnet, "On His Blindness." Speaking at a reception in her honor after the christening and launching of the new fast-attack submarine, Mrs. Rickover said: "Today, I have one thing I want to do that may seem strange to some of the men in uniform, but I'm not denigrating anything they stand for because I wore the uniform and had a very exciting life. I want to take this opportunity and extend the honor that's accorded me and salute the Navy wife."

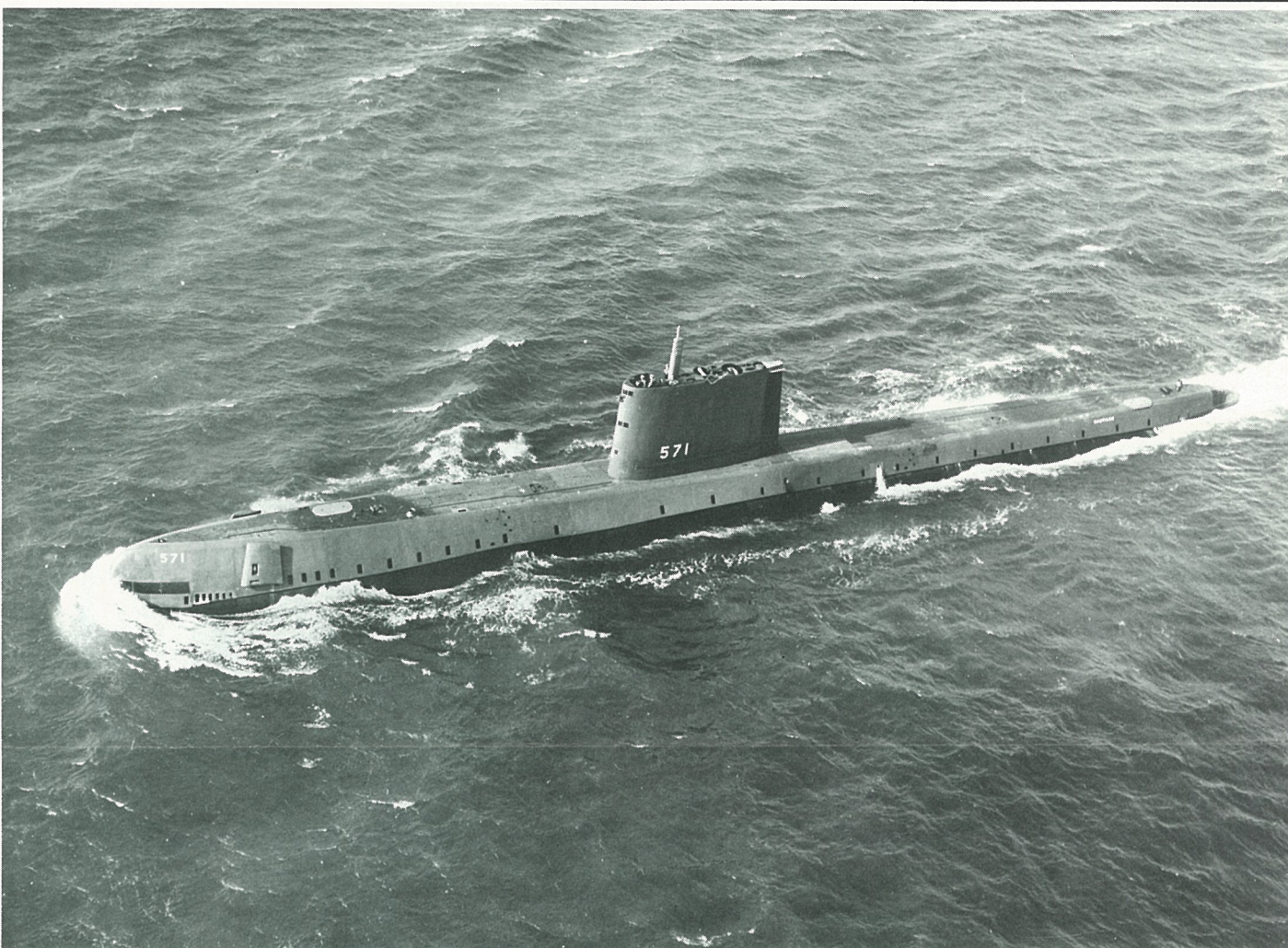
Mrs. Rickover said she did this because of the importance of the Navy wife who "allows her husband to have the best of both worlds. And maybe they don't think about that too often."

Mrs. Rickover broke a bottle of champagne across the bow of the submarine, saying, "In the name of the United States, I christen thee *Hyman G. Rickover*. May God bless her and all who sail in her." Then, she said, she "deviated a little" by adding a "few words of my own and the last line from Milton, one of his sonnets." This addition, she said, was, "May God bless their families and loved ones, for they also serve who only stand and wait."

A retired Navy nurse, Mrs. Rickover said she was deeply honored and proud to have christened the *Hyman G. Rickover* "I am equally as proud to have served in the United States Nurse Corps, but most of all," she said, "I am proud of my husband and proud to be his wife."

"He is a very warm, kind and human person," she added. "I have the greatest prize there is, and that is my husband." Mrs. Rickover said that the day before the admiral and she were married, the then Secretary of the Navy told her that she was taking on an awesome responsibility because her husband was an institution. "Had I thought of him as an institution, I probably would not have said 'Yes,' she said.

Mrs. Rickover said the day of the *Hyman G. Rickover* launching was filled with great emotion for her "because how many people can break a bottle of champagne and utter their husband's name?"



*The USS Nautilus, World's First Nuclear Submarine.*

## GD Flashback

### Nuclear Age For Submarines Began with Nautilus

It was one of the most significant radio transmissions in the history of the U.S. Navy. As the revolutionary new submarine left the docks of Electric Boat at Groton, Conn., on Jan. 17, 1955, her skipper, Cmdr. Eugene Wilkinson, radioed: "Underway on nuclear power."

The USS *Nautilus*, the world's first atomic powered submarine, was starting her initial sea trials, ushering in the new era of nuclear energy in marine transportation.

The seed for the *Nautilus* was planted in February 1950 when a Navy captain told a group of naval officers and civilians meeting at Electric Boat about his plan to build the world's first atomic submarine. The captain was Hyman G. Rickover, head of the newly established Naval Reactors Branch of the U.S. Atomic Energy Commission.

As Rickover outlined his program, Electric Boat officials realized that the program would be exacting and challenging. The Westinghouse Electric Corp. had already been selected to build a reactor power plant, and Electric Boat was given the task of building a dry-land submarine prototype at the AEC's Arco, Idaho, installation. Electric Boat technicians would have to fit Westinghouse's atomic power plant into the prototype to prove it out under simulated submarine conditions. If all went as expected, Electric Boat then was to build the actual sea-going submarine, installing not only a nuclear-steam propulsion system but also a standby diesel-electric propulsion system.

Electric Boat knew it was in for a demanding pioneer effort as no shipyard at that time had more than limited knowledge of the technical and management problems involved in the new field of atomic energy. To make matters tougher, the Navy assigned the program a "crash" priority.

Electric Boat officials worked closely with Rickover, who directed the design and construction of the Arco power plant prototype and the *Nautilus*. Hundreds of engineers and other specialists were hired by the shipyard. After only 30 months from Rickover's first meeting at Electric Boat, the Arco prototype was built and proven, and on June 14, 1952, President Harry S. Truman welded his initials on the keel plates of the *Nautilus*. On Jan. 21, 1954, Mrs. Dwight D. Eisenhower broke a bottle of champagne across the bow of the *Nautilus* (SSN 571) and the ship slid down the ways into the Thames River.

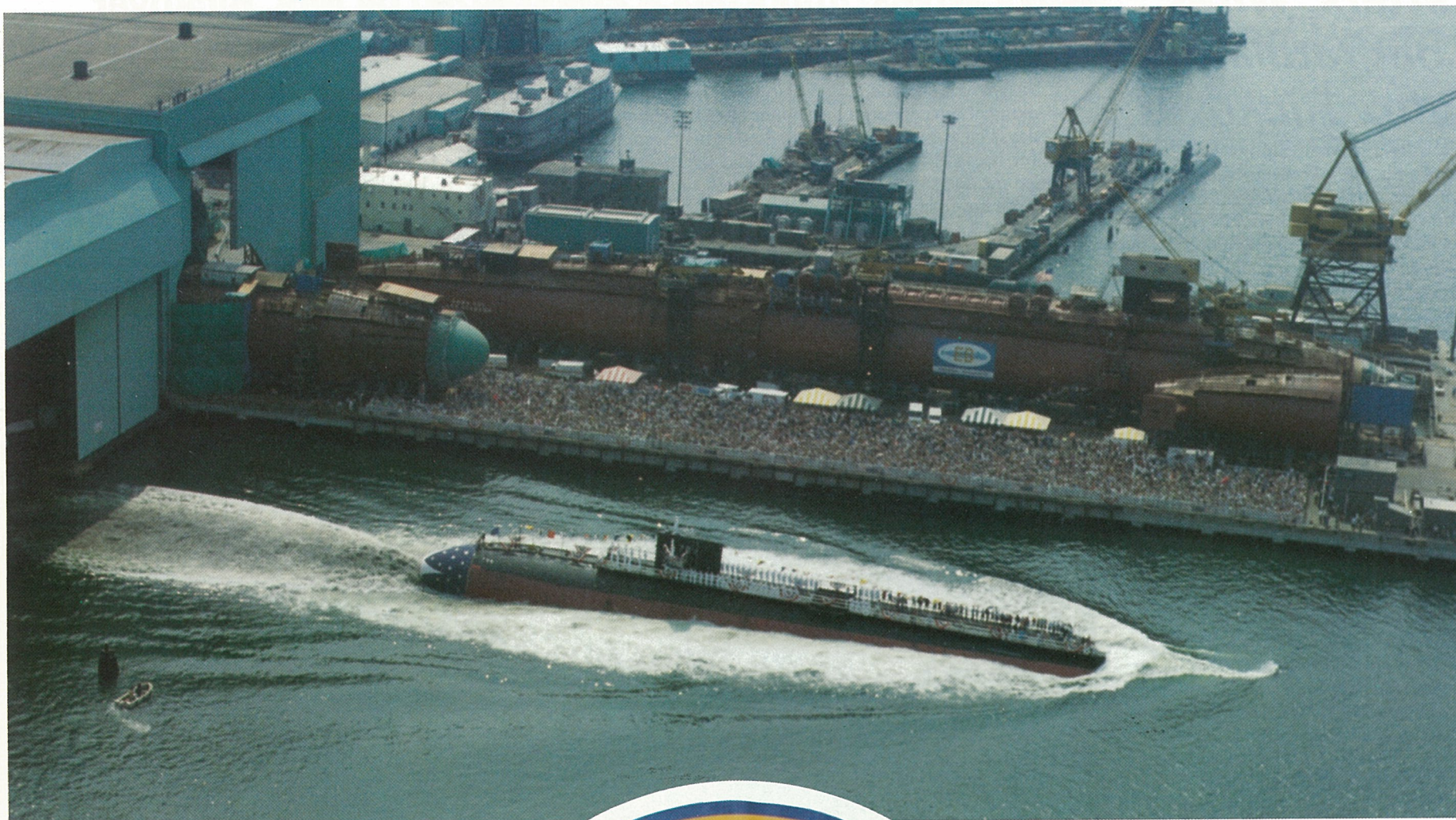
The 320-foot, 3,500-ton ship was commissioned on Sept. 30, 1954, and this was followed by 15 months of dockside testing. Finally, at 11:01 a.m. on Jan. 17, 1955, she cast off on her maiden voyage, and Commander Wilkinson sent his historic message at 11:33 a.m. Her subsequent sea trials far exceeded all expectations. On her shakedown cruise in May 1955, the *Nautilus* steamed submerged from New London, Conn., to San Juan, Puerto Rico, more than 1,300 miles in 84 hours, at an average speed of 16 knots. Later, she steamed submerged from Key West, Fla., to New London, Conn., a distance of 1,397 miles, averaging 20 knots.

In August 1958, she made the first polar transit in history from the Pacific to the Atlantic, an 8,146-mile trip from Pearl Harbor to Portland, England in 19 days. She cruised completely under a polar icecap from the Bering Sea to the Greenland Sea, demonstrating that she could operate in the Arctic Sea and opening up a possible new underwater commercial route. The feat earned her skipper, Cmdr. William R. Anderson, the Legion of Merit, and the entire crew was awarded the Presidential Unit Citation, the first one ever given in peacetime.

For the 25 years of her active service, the *Nautilus* was homeported at Groton. She was decommissioned in March, 1980, and has been berthed since at the Mare Island Naval Shipyard at Vallejo, Calif. On June 17, 1982, she was designated an official historic landmark by the U.S. National Park Service, and a campaign is in progress to bring her back to Groton permanently. The Connecticut Nautilus Committee hopes to raise \$4.5 million for a berth for the ship and a museum at Goss Cove in the Thames River. Congress appropriated \$1.93 million for the \$7.5-million project, and the State of Connecticut added another \$1 million.

The honor is richly deserved by the *Nautilus*. She preceded the first Soviet nuclear submarine by about five years and ranks as one of the most important developments in world naval history.





**Eventful Day for the Rickovers.** Aug. 27, 1983 was a memorable day in the lives of Admiral and Mrs. Hyman G. Rickover. First, Mrs. Rickover christened a nuclear submarine in her husband's name, just before it was launched into the Thames River at Groton, Conn. (top photo). Later, during a reception in her honor, Mrs. Rickover received a number of gifts, including a polished pewter launch bottle casing from David S. Lewis, Chairman and Chief Executive Officer of General Dynamics (center, left). Admiral James D. Watkins, Chief of Naval Operations, presented Mrs. Rickover with a lithograph of an oil painting of the USS Nautilus when it was under construction (center, right). Admiral Rickover, who posed with his wife (center photo), also posed with several members of the original

"Rickover Group" which, together with Electric Boat, performed the design and engineering work on the Nautilus and the prototype reactor (lower, left). Shown from left to right are: William Humphrey, Ed Kintner, James Dunford, Ted Rockwell, Robert Panoff (front), Harry Mandel, Admiral Rickover, John O'Grady (rear), John Henchey and Charles Weaver. Admiral Rickover also is shown (lower, right) with officers of the Hyman G. Rickover. They are, left to right: Lt. (j.g.) Gregory Coons; Lt. (j.g.) Stephen Kellety; Lt. Michael Alfonso; Lt. Cdmr. Kevin Cheesebrough; Cdmr. Fredrik H. M. Spruitenburg, prospective Commanding Officer; Admiral Rickover; Lt. Cdmr. Russell M. Carr, Executive Officer; Lt. David Grimes, Lt. Michael Jordan and Ens. Earl Dietz.



## Quincy Lays Keels for First Two Maritime Prepositioning Ships

Keels for the first two of five Navy Maritime Prepositioning Ships (MPS) were laid at a dual ceremony at Quincy Shipbuilding on September 16th.

Mrs. Barbara Kelley, wife of Marine Corps Commandant Gen. Paul X. Kelley, welded her initials on two hull sections to symbolically mark the start of construction and declared the keels "...well and truly laid."

Gen. Kelley, principal speaker for the ceremony, told about 3,000 Quincy employees and guests that he was confident "that these great ships that (Quincy) is going to build will be the finest in their class anywhere in the world."

Gen. Kelley said that the MPS ships will be named for two Marines who were posthumously awarded the Medal of Honor: 2nd Lt. John P. Bobo and Pfc. Dewayne T. Williams. Families of both men attended the keel-laying ceremony.

The two new MPS ships will be officially named in honor of the two Marines when they are completed in the spring of 1985. The remaining three ships are scheduled for delivery in September 1985, December 1985 and March 1986.

Gary S. Grimes, Vice President and Quincy General Manager, told the crowd the MPS program was important for three reasons: First, "because of the meaningful job opportunities it represents for Quincy shipbuilders in the months ahead." Second, "it is the key to establishing Quincy as a team the Navy can depend on in the design and construction of auxiliary, amphibious and sealift vessels." And third, "because of the ships themselves. They are vital to one of the Navy's most challenging missions — support for America's Rapid Deployment Force and our ability to project credible military strength wherever

and whenever needed throughout the world."

Representing the Navy at the ceremony were Vice Adm. William H. Rowden, Commander of the Military Sealift Command, and Everett Pyatt, Principal Deputy Assistant Secretary of the Navy for Shipbuilding and Logistics.

Representing General Dynamics were David S. Lewis, Chairman and Chief Executive Officer, and James R. Mellor, Executive Vice President for Marine, Business Systems and Corporate Planning.

Quincy Shipbuilding will build five of 13 Maritime Prepositioning Ships that will come under Military Sealift Command charter. The other eight ships will be converted from existing ships by other shipyards.

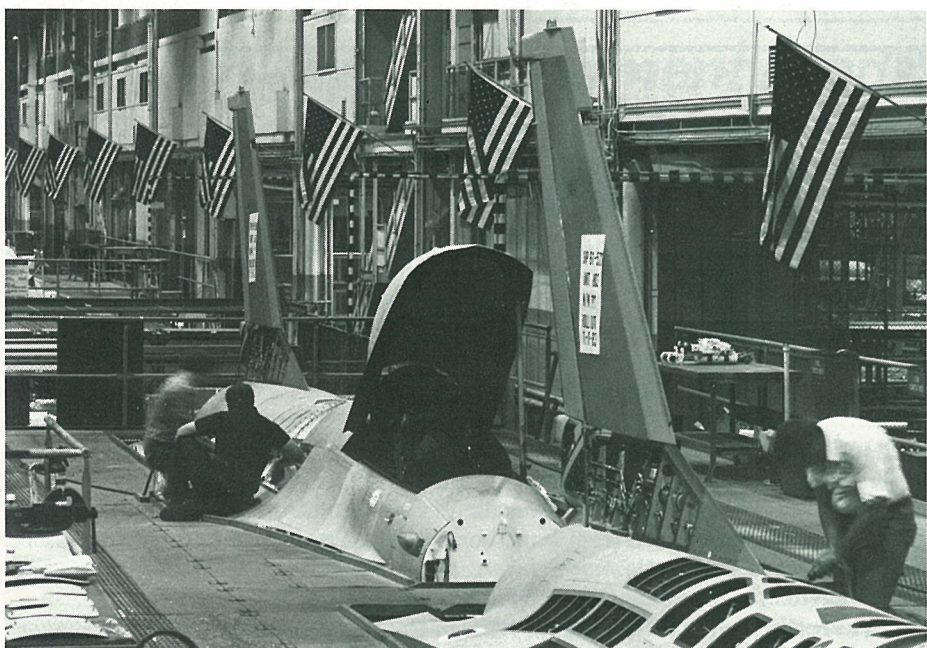
Quincy's ships will have an overall length of 671 feet, a beam of 105 feet, 6 inches, a draft of 29 feet, 6 inches, and a speed of 18 knots.

The Maritime Prepositioning Ship program is an integral element of the Rapid Deployment Force concept of operations. This concept forms the backbone of the U.S. immediate-response capability throughout the world, by providing for the rapid deployment of a large combat force with equipment and supplies for 30 days of sustained operations.

## Pomona Awarded Army Contract For Stinger-POST

The U.S. Army Missile Command has awarded Pomona an initial \$49.9 million production contract for Stinger-POST (Passive Optical Seeker Technique), a modular subsystem improvement to the Stinger weapon system now in production.

The contract calls for delivery of 44 Stinger-POST missiles by December 1986, with the first delivery scheduled for October 1986.



American Flags Brighten F-16 Assembly Line

## American Flags Demonstrate Fort Worth Employee Patriotism

The red, white and blue of 130 American flags now adorns a 3,450-foot stretch of the F-16 assembly line at Fort Worth as a symbol of factory workers' pride and patriotism.

The flags were purchased with more than \$2,000 in voluntary contributions from employees in the Production and Quality Assurance Department. The employees were asked to limit their individual contributions to \$1.

"Many people had suggested that we display the United States flag in the factory, and when we started to seriously consider the idea, a number of employees asked to be a part of the project," said Charles N. White, Vice President-Production.

The flags, which were put up in September, are located 50 feet apart on the walls of both sides of a factory area that is called the "200-Foot Bay" because of its width.

Bill Plumlee, Director of F-16 Component Assembly, said, "The employees did this to let people know what they stand for, as well as to improve the appearance of their work area."

"I think it is a terrific idea to show our flag here," said Charles Shaw, a Plumbing and Hydraulics Assembler in the center fuselage assembly area. "I take pride in building our airplane, which I think is the best in the world."

"I think the flags will be inspiring to everybody who sees them," added Manuel Martinez, a co-worker in the area.

D. J. Talley, Vice President-Quality Assurance, said, "We thought displaying the flag was a good idea because the division makes a vital contribution to national defense and our factory is considered by many to be the best aerospace facility in the world."



**Zero Defects.** The first defect-free M60A3 tank produced at the Detroit Arsenal Tank Plant is commemorated by, left to right, Eric E. Smith, Vice President — Quality; Glen Dandie, Inspector; Steve Distefano, Repairman; Paul Marshall, Inspector; Archie Acharya, DATP Manager, and Lt. Col. Michael W. Boudreau, DATP Commander.

## Land Systems Delivers Its First M60A3 Tank with Zero Defects

Land Systems recently delivered its first M60A3 tank declared defect-free by inspectors of the U.S. Army's Deprocessing Teams.

The M60A3 tank was one of 54 tanks built at the Detroit Arsenal Tank Plant and delivered to the South Carolina National Guard.

Deprocessing teams from three separate Army Commands conducted extensive inspections of each tank's automotive, fire control, communications and turret control systems. Of the 54 tanks deprocessed at Fort Stewart, Ga., 20 tanks had zero defects in the automotive and fire control systems and 16 tanks were defect-free in the communications and turret control systems.

Eric E. Smith, Vice President - Quality, said this delivery and the delivery by the Lima Army Tank Plant of the first zero-defects M1 tank in August show the

continuing improvement in quality at Land Systems.

Smith said the zero-defects program has been given added emphasis by Land Systems in the 19 months that the division has been a part of General Dynamics.

"The inspections by the Army teams are thorough and designed to be as tough as possible," Smith said. "To achieve a zero-defects tank with its many thousands of parts is a very difficult task. Something as minor as a missing screw or a run in a paint job would disqualify a tank from being classified as zero-defect."

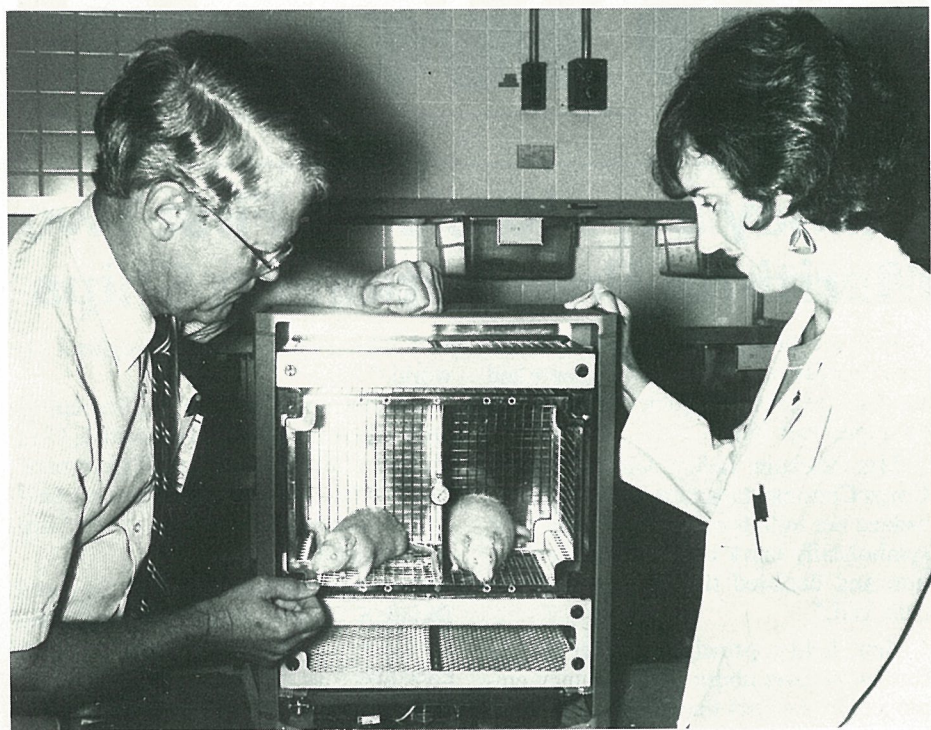
Archie Acharya, Detroit Arsenal Tank Plant Manager, said, "Land Systems workers are looking forward to the day when delivering zero-defects products will be commonplace."

Land Systems has produced 2,169 M60A3 tanks for the United States and its allies.



**Keels Well Laid.** In the top photo, Mrs. Barbara A. Kelley, wife of Marine Corps Commandant Gen. Paul X. Kelley, prepares to weld her initials in the keel of a Navy Maritime Prepositioning Ship with the assistance of Thelma Watts, First Class Welder at the Quincy Shipyard. In the lower photo, some of the 3,000 employees and guests witness the ceremony.





**Space module.** Dr. Malcolm Smith of NASA's Space Adaption Research Branch and Patricia Inners, research technician, check two rats in Convair's animal enclosure module. The module was aboard the Shuttle Challenger on its recent space flight.

## Convair-Sponsored Experiments Aboard Challenger Space Flight

Convair, which has been represented by some big items in the U.S. space program — Atlas and Centaur rockets and the Shuttle midbody, for example — had two experiments aboard the recent *Challenger* space flight that were smaller than a suitcase.

The first was a Convair-designed and -built animal enclosure module (AEM) that carried six laboratory rats. They made the flight into space as part of an experiment to determine the effects of weightlessness on arthritis in rats and, by inference, in humans.

The AEM was devised by Daniel Weber of New York City for a nationwide high school science project competition last year. The module was built by Convair as part of the division's sponsorship of the winning student experiment.

Extensive ground testing by NASA verified that the AEM could house animals in relative comfort and prevent odors or contaminants from escaping into the crew cabin. The flight marked the final test of

the AEM's ability to support healthy animals in a zero-gravity environment, and the rats' reactions were monitored and photographed by the crew members during the flight.

NASA decided to test the system first with healthy rats and plans to use rats with arthritis in the final phase of the experiment on the Shuttle flight scheduled for next January.

The *Challenger* also carried three mirror samples for the General Dynamics solar concentrator to test their durability in space. The samples were prepared by Convair using a novel, low-cost process that has the potential of greatly reducing the cost of space solar arrays — devices that convert solar energy to electrical energy for satellite use.

Data from the experiment will be used to determine a design and fabrication approach for the five solar concentrator modules to be delivered to the Air Force in 1984.

## Corporate Tennis Tourney Won By Data Systems Doubles Team

Two employees from Data Systems' Central Center at Fort Worth have won a companywide competition and will represent General Dynamics in a regional corporate tennis tournament in St. Louis October 21st-23rd.

The competition will involve doubles teams from companies in the Midwest as part of a national corporate tennis tourney held for the benefit of the National Cystic Fibrosis Foundation.

The General Dynamics team consists of Lytton Allen, Software Engineer-Associate, and Bill Durham, Programmer/Analyst. Allen, 22, played on the tennis team at Northwestern State University of Louisiana and in 1981 was the state singles champion in Texas in the under 21 class. Durham, 26, was on the team at Western Illinois University and in 1979 was the conference singles champion.

Durham and Allen qualified for the regionals by winning an invitational competition held in September at Fort Worth involving teams from 10 General Dynamics divisions. The teams had been selected through elimination playoffs held previously at the individual divisions.

Allen and Durham said they had not played as a team until the Fort Worth competition.

The regional competition at St. Louis will be held at the Forest Lake Tennis Club and will consist of teams from 16 to 20 companies in the Midwest, one of eight regions to be represented. Regional winners will advance to the finals, which will be held in Memphis, Tenn., in February

1984 in conjunction with the National Indoor Tennis Championships.

The national corporate competition, held for the first time this year, is sponsored by Holiday Inns, Wilson Sporting Goods and World Tennis Magazine. The magazine organized the tourney and set up the rules. The rules specified that participants must be employees of the companies they represent and not teaching or touring pros. The teams could be male, female or mixed.

In addition to supplying teams, participating corporations have made donations to the National Cystic Fibrosis Foundation.

General Dynamics' participation in the tournament has been supervised and coordinated by John C. Kane, Corporate Director - Administration.

The company's competition at Fort Worth was arranged by the Fort Worth Industrial Relations Department, with the assistance of the General Dynamics Recreational Association. Bob Howse, Director - Tennis Activity of the association, was the tournament director.

In addition to Durham and Allen, other team members and their placement were:

Second place — Frederick DeGrooth and Michael Stefanski, from Electric Boat.

Third place — Brad Gardner and Chuck Hobbs, from Fort Worth.

Fourth place — Tom Daria and Bill Smith, from Land Systems.

Consolation winners — Carlos Mora and Jim Strachan, from Convair Recreation, which included the Electronics Division.

## Around the World... ...in GD

**CHQ:** Cathy S. Bassman joined as Corporate Senior Consolidation Accountant . . . Keith A. Ingram joined as Corporate Network Transmission Engineering Manager . . . Joni L. Bouelle transferred from Convair and was promoted to Auditor . . . Wayne H. Killough, Jr. transferred from Fort Worth and was promoted to Corporate Office Personnel Manager . . . Othmar Schwarzenberger transferred from Fort Worth and was promoted to Corporate Director-Europe.

**Fort Worth:** Robert H. Anderson, William R. Garver, Kenneth G. Kibler, William A. Rogers, Elbert L. McKague, Jr., and Francis H. Chang were promoted to Engineering Chief . . . Howard R. Bissell to Senior Field Engineer . . . Donna N. Collins and John M. Ross to Senior Program Analyst . . . Carl L. Copeland and Derrel D. Downey to Tooling Supervisor . . . Bobby R. Craig to Manufacturing Control Supervisor . . . Glenn R. Dixon to Logistics Contract Representative . . . Clarence D. Dunning to Industrial Engineer . . . Robert W. Ealey and Thomas R. Newell to Field Service Engineer . . . Jerry E. Francis to Logistics Engineer . . . James L. Hodgkins III and Daniel W. Johnson to Project Manager . . . William G. Hombach to Engineering Associate Analyst . . . Thomas M. Kearns to Senior Manufacturing Technology Engineer . . . Robert B. Lillie to Administrative Program Planner . . . George A. Lindsey and John L. McKinney to Logistics Group Engineer . . . Lindy L. McIntosh to Manufacturing Control Supervisor . . . Perry A. Nation to Senior Engineering Administrative Assistant . . . Roger A. Parsley to Industrial Engineering Supervisor . . . John W. Speight II to Manufacturing Technology Supervisor . . . Hoyt L. Stevens to Assistant Project Engineer . . . Johnny E. Stoeppelman, Jr. to Manufacturing Control General Supervisor . . . Stephen A. Thompson to Senior Marketing Representative . . . Robert G. Turner to Subcontract Management Representative . . . James P. Vickers to General Foreman . . . James S. Wells to Technical Group Supervisor . . . Grady L. White to Production Specialist . . . Charla K. Wise to Change Proposal Supervisor . . . Bill G. Yee to Engineering Project Manager.

**Electric Boat:** John Alden was promoted to Site Manager . . . William Dickerson to Chief of Reprographic Services . . . Raymond Jones to Engineering Supervisor . . . Edward Horton to Foreman . . . Frederick Schlacter to Engineer . . . Francis Wehner to Engineering Program Specialist.

**Land Systems:** Ronald A. Fuhrman was promoted to Manager of Industrial Engineering . . . David Repokis to Logistics Engineering Specialist . . . Josephine A. Myers and Anne E. Fischer to Documentation Control Supervisor . . . Daniel J. Conniff to Chief of Procurement . . . Donald Kozlowski to Production Planning Specialist . . . Dennis M. Hickmott to Chief of Financial Analysis . . . Linda J. Walter to Senior Business Planning Analyst . . . John R. Pepperman and Richard H. Baginski to Accounting Supervisor . . . William R. Rollins Jr. to Program Director-LVT(X) . . . Francis E. Alloway to Senior Quality Assurance Engineer . . . Michael L. Little to General Foreman . . . Stephen A. Wasik and Ronald G. Misch to General Foreman-Inspection . . . Charles W. Johnston to Clean Team Supervisor . . . Edward J. Van Horn to Guard Captain . . . Attila A. Oery to Senior Engineer . . . Gary N. Biddlingmeier to Senior ILS Field Engineer . . . Chris G. Nacu to Senior Logistics Engineer . . . Jeffrey P. Czuchaz to Senior Buyer.

**Convair:** Michael T. Criscuolo and Donald H. Naish were promoted to Operations Supervisor-Manufacturing Control . . . Donald E. Jaszewski, Sr., to Engineering Laboratory Supervisor . . . Leo H. Wilson to Operations Supervisor-Manufacturing.

**Electronics:** Charles B. Andrews, Jr., was promoted to Supervisor . . . Robert Barnes, Richard Dobbin, Edward P. Farrell and T. J. Hurley to Senior Planning and Control Analyst . . . F. D. Chatfield to Senior Administrative Engineer . . . James W. Forbes to Engineering Test Support Supervisor . . . J. E. Greenfield, Louie Ortiz and P.A. Wheiland to Section Head-Operations . . . W. R. Horney to Engineering Manager . . . Victor N. Jacobs to Planning/Control Section Head . . . Thomas E. Munson to Senior Buyer . . . C. S. Puckett to Marketing Analyst . . . Kenneth Zolkoski to Planning/Control Specialist.

**Pomona:** Marilyn H. Brehm was promoted to Administrative Services Supervisor . . . Donald E. Brieske and Oscar Arroyo to Group Engineer . . . Roger E. Favreau to Director-International Business Administration . . . Ronald N. Fuller to Manager-Government/Industry Relations . . . Thomas H. Graham, Alan D. Coleman II, Ronald L. Miller and Brian L. Siegmann to Project Representative . . . William R. Mabry to Superintendent . . . Charles E. Reno to Director Systems/Support Logistics . . . Diane E. Roberts to Material Liaison Representative . . . Joseph J. Tynar to Manager of Procurement . . . Richard D. Ubbink and Arthur M. Ramirez to Manufacturing Engineer . . . David J. Anderson to Senior Quality Assurance Specialist . . . James L. Burns and Lee T. Crowell to Manufacturing Development Specialist . . . Ronald F. Carlson to Senior Test Engineer . . . Thomasane A. Chapple and Jose P. Peralta to Project Administrator . . . David E. Gibbs to Manager-Phalanx Production Assurance . . . Allen C. Hagelberg to Marketing Director . . . Karen L. Lynch to Research Engineer . . . Clifford R. Piequet to Manufacturing Supervisor . . . Peter L. Sapier to Training Specialist . . . Melvin D. Smith to Senior Property Auditor . . . David A. Vendetti to Senior Facilities Specialist.

**Datagraphix:** David E. Hale, Jack B. Randall and Eugene G. Lickteig were promoted to Area Supervisor . . . Donald L. Harter to District Service Manager.

**DSB:** At Home Office, John H. Caywood transferred from Eastern Center and was promoted to Administrative Financial Specialist.

### Savings and Stock Investment Values

Salaried	August 1981	August 1982	August 1983
Government Bonds	\$ 2.0366	\$ 2.0660	\$ 3.1197
Diversified Portfolio	2.1407	1.8749	3.1727
Fixed Income	1.2385	1.3786	1.5443
Hourly			
Government Bonds	2.6133	3.1113	3.4885
Diversified Portfolio	2.0803	2.1088	3.1840
GD Stock	\$22.8750	\$33.5000	\$47.7500



## Research and Development Leads To Future Convair Production

The seeds of production contracts often are planted by a variety of research and development activities, and Convair today is actively engaged in a number of promising research and development efforts.

R. D. McKelvey, Manager of Contract Research and Development, said that Convair now holds 35 active CRAD contracts — primarily from the U.S. Government — with a value that exceeds \$85 million.

"Any one of these contract studies could," according to McKelvey, "become a production program in the future. Or, the research could lead to a dead end, with no production of hardware."

For example, McKelvey said, Convair's Atlas program, which began as an intercontinental ballistic missile for the Air Force and has since transitioned into the nation's workhorse space launch vehicle, started as an Air Force CRAD program more than 30 years ago. Centaur, its companion high-energy upper stage, also came from an initial research contract.

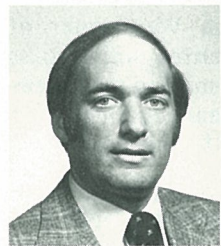
The integration of Centaur with the Space Shuttle was a company-funded program for nearly 10 years, culminating in the announcement in January 1981 that NASA would use Centaur for two missions from the Shuttle in the mid-1980s. Two Air Force missions were added in 1982, and additional missions are under consideration.

The Tomahawk Cruise Missile began with a design concept study contract in 1972, and in 1976 Convair was selected by the Navy to proceed into systems integration. Convair is now in rate production on three versions of the missile, with other versions being tested.

## Winkler and Dunbar Named to New Posts In Space Programs

Two key appointments have been made in Convair's space programs.

Martin K. Winkler, who has been Program Director-Atlas/Centaur, has been named Program Director-Shuttle/Centaur. Replacing him as Program Director-Atlas/Centaur is Dennis Dunbar, who has been serving as Program Director of the 767 Strut Program.



Winkler



Dunbar

Winkler joined General Dynamics in 1964 immediately after graduation from Cornell University, where he earned a Bachelor of Science degree in Electrical Engineering. In 1968, he received a Master of Science degree in Aeronautical Sciences from the University of California at San Diego.

Dunbar earned a Bachelor of Science degree in Mechanical Engineering from Lowell Technological Institute in 1967 and joined General Dynamics immediately thereafter. He received a Master of Science degree in Aeronautical Engineering from San Diego State University in 1971 and a Master of Science degree in Systems Management from the University of California at San Diego in 1978. He has been Program Director of the 767 Strut Program since 1980.

McKelvey said "the normal situation is a combination of customer funding and internal company funding on a research and development program. Usually, the expertise to qualify for a contracted program is developed by internal funding of a technology development." The internally funded concept, McKelvey added, is then developed further with contract funds. "In any case, the goal is to provide the company with a business and production base that will continue for years to come," he said.

Three contracts were cited by McKelvey as having long-term potential. The Flight Dynamics Laboratory of the Air Force has contracted for a study of a Boost-Glide Vehicle, a suborbital space vehicle capable of maneuvering in the upper atmosphere. Fiscal Year 1983 funding for this contract is \$253,000.

Another CRAD contract, also from the Flight Dynamics Lab, calls for testing Convair's Spacecraft Maneuvering Module. The Spacecraft Maneuvering Module was built using company discretionary funds, which led to the contract to conduct static structural tests of the module.

As an example of how far into the future some of these research programs look, McKelvey said, Convair is in the midst of a study for TRW and the Department of Energy called the "Mirror Advanced Reactor Study," involving the design of a fusion reactor power system for approximately 2030 A.D. "This study, as well as the company's work in superconducting magnets, could position Convair to be a significant force in electrical generating systems that will ultimately replace conventional and nuclear power plants," he said.



**Proud Editor.** A. R. Thompson, editor of *Managair*, displays the plaque the publication won recently at the National Management Association conference in Milwaukee. *Managair*, published by the Convair Chapter of the NMA, was selected as top award-winner of the more than 100 chapter newsletters entered in the national competition. *Managair* last won first place in the 1976 competition.

## Fort Worth Receives Design Contract

Fort Worth recently received a contract for almost \$1 million from the U.S. Air Force for conceptual design of an Advanced Tactical Fighter aircraft.

The ATF is intended to be the Air Force's air superiority fighter for the 1990s and beyond.

Under terms of the \$997,747 contract, Fort Worth is to present its concept to the ATF Concept Development Team at the Air Force Aeronautical Systems Division, Wright-Patterson AFB, Ohio, in mid-1984.



**Production Progress.** The production line for Convair's Ground Launched Cruise Missile transporter erector launchers and launch control centers at Plant 19 shows several TELs in various stages of completion. All TEL and LCC production is being consolidated at Plant 19 to improve manufacturing efficiency.

## Convair Consolidating All TEL/LCC Manufacturing, Testing at Plant 19

All manufacturing and testing for the transporter erector launchers and launch control centers of the Ground Launched Cruise Missile are being consolidated at the Convair-operated Air Force Plant 19 at San Diego to improve manufacturing efficiency.

Until this consolidation began, initial manufacturing and assembly of the TELs and LCCs were performed at Plant 19, and the partially completed units were moved to Kearny Mesa near San Diego for installation of the electrical and electronic equipment and for testing. The vehicles were then painted at Lindbergh Field.

In addition to the consolidation, a number of manufacturing improvements are being made in the process. For example, a single automatic machine now drills and rivets the TEL bottom plate, providing

both substantial savings in manufacturing time and reductions in rework.

By the end of 1983, all assembly and final testing will be performed at Plant 19. In addition to manufacturing, all program support including the GLCM program office and design engineering personnel are slated to move to Plant 19 by the first of the year.

By mid-September, 16 TELs and 7 LCCs had been delivered to the Air Force, along with a number of trainers, simulators, and GLCM-unique test equipment.

The first truck equipment — TELs and LCCs — and missiles will be sent to Main Operating Base #1 at RAF Greenham Common, England, this fall, and the formal Initial Operating Capability is to be achieved by December. Eventually, six flights of four TELs and two LCCs each will be at that base.

## Adopt-a-School Program Works For Both Students and Company

Convair and Electronics divisions are participating in the Adopt-a-School Program of the San Diego Unified School District. Under the program, Convair has "adopted" Morse High School as its project, and Electronics has "adopted" Serra High School. Both divisions have been working to link the capabilities and experience of the divisions with the particular needs of the schools. In both cases, the adoption was a joint project of the division and its chapter of the National Management Association.

During the past school year, the divisions conducted demonstrations and seminars in Computer-Aided Design/Computer-Aided Manufacturing, as well as courses in engineering, technical writing, computer programming and drafting. Plant tours of both divisions were also conducted for faculty and students.

Electronics also conducted a seminar in job interviewing, attended by more than 80 students, while more than 200 attended career presentations given by Electronics employees.

## Two USAF Officers Will Train at Convair

Two Air Force officers, Maj. L. T. McOmber and Capt. D. R. Maas, have joined Convair for training under the Air Force's Education-with-Industry program.

McOmber comes to Convair from San Diego State University, where he was Assistant Professor of Aerospace Studies and Commandant of Cadets in the AFROTC program. Maas has been Chief of the Titan II Equipment and Maintenance Branch at 15th Air Force Headquarters, March AFB, Calif.

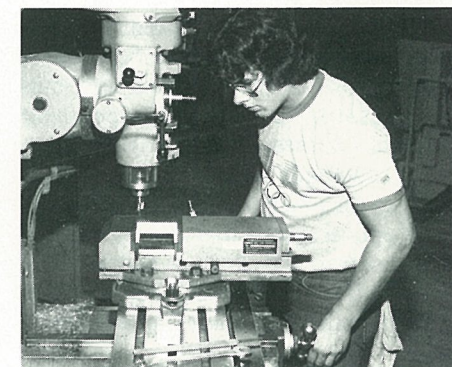
During the 10-month training program in industrial management, McOmber and Maas will first visit the various departments of the division and then will spend 32 weeks in specific job assignments as management trainees.

Many of Serra's classes and laboratories have benefited from donations of surplus and salvageable material, including electronics parts and test and calibration equipment. Convair also donated surplus technical books and magazines to the Morse library.

## Machinist Rojas Places Sixth In Skill Olympics

Dan Rojas, a tool and die maker at Pomona, has placed sixth in the machining competition at the International Skill Olympics at Linz, Austria, the highest finish ever recorded by an American.

Rojas, 20, the nation's No. 1 young machinist, was the only U.S. representative at the event, which is held every four years. He competed against champions from 12 other nations after having won local, regional, state and national contests sponsored by the Vocational Industrial Clubs of America (VICA).



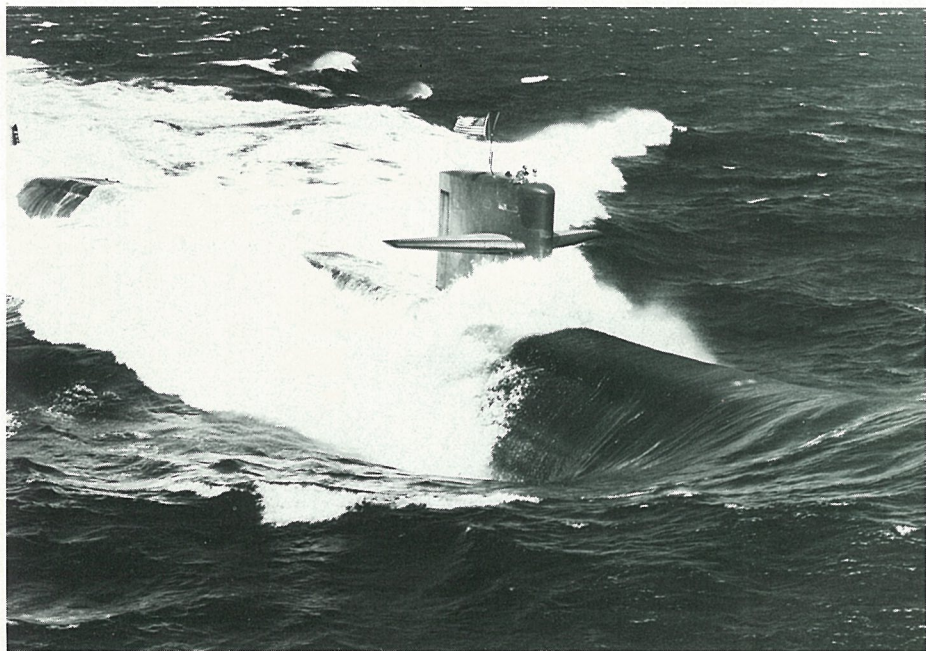
Rojas on the Job

Rojas' training at the division prior to his going to Austria was coordinated by Bill Clarke, Development and Training Administrator in Professional Development/Training. Clarke also accompanied Rojas to the competition.

## GD World

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The USS Portsmouth Under Way

## Navy Commissions USS Portsmouth; Was Fifth Boat in a Row Delivered Early

Electric Boat's 15th 688-class fast-attack submarine, USS *Portsmouth* (SSN 707), joined the fleet during commissioning ceremonies October 1st at the Portsmouth, N.H., Naval Shipyard.

U.S. Senator Gordon J. Humphrey, Republican from New Hampshire, was the principal speaker at the event, which was attended by several hundred spectators and guests.

The 360-foot, 6,900-ton ship is named for cities of the same name in New Hampshire and Virginia. The respective mayors,

Peter Weeks and Julian Johansen, spoke during the ceremonies.

Mrs. Helen Poe Goodrich was sponsor of the submarine. She is the wife of Navy Under Secretary James Goodrich. Mrs. Goodrich had christened USS *Portsmouth* on Sept. 18, 1982, during launching ceremonies at Electric Boat's shipyard in Groton, Conn.

USS *Portsmouth* was delivered to the Navy August 27th, eight weeks ahead of schedule, making her the fifth submarine in a row that Electric Boat has delivered early.

## FBI Uses Material Service Quarry For Explosives, Arson Training

Material Service Corporation's massive limestone quarry at Thornton, Ill., was the site of a recent bomb and arson training session for local law enforcement officers sponsored by the Federal Bureau of Investigation.

The session was designed to acquaint the police officers with procedures for the safe handling of explosive devices and to introduce them to the latest life- and property-threatening devices used by arsonists.

Morris Lauwereins, Material Service's Vice President of Operations, said the Thornton Quarry serves as a good location for a safe demonstration of almost every type of explosive. "It offers a large enough expanse of space to allow for safe bomb detonation while limiting noise and vibration within its deep, below-ground walls," he said.

Thornton Quarry, just south of Chicago, is one of the world's largest commercial stone quarries. The facility mines more than six million tons of stone a year and produces over 40 different products, ranging from sand to large riprap stone.

Two special agents and explosive experts for the FBI conducted the four-day program which involved bomb technicians from the four-state area of Illinois, Indiana, Iowa and Wisconsin. The FBI spon-

sors such training sessions through the Bomb Data Center, Washington, D.C.

William E. Dyson, FBI special agent and explosives expert, said, "Without the cooperation of Material Service in allowing the FBI the use of its quarry, it would be virtually impossible for law enforcement officials to get the necessary expertise in bomb disposal and demolition."

Over the past several years, area police and fire departments have used the Material Service quarry for similar training sessions. Periodically, the FBI and local departments also use the quarry to dispose of contraband explosives.

The local training sessions have been praised by municipalities which cannot afford to send their law enforcement employees to the Redstone Arsenal or to the Hazardous Devices School in Huntsville, Ala. Previously, the school was the only place local police could obtain such training.

## Convair Is Awarded USAF Study Contract For Laser Guidance

Convair has been awarded a \$355,000 study contract by the U.S. Air Force Armament Division at Eglin AFB, Fla., to develop the conceptual design of a laser radar guidance system for use in tactical air-launched missiles.

A laser radar, called a ladar, uses a low-power carbon dioxide laser in the far infrared band instead of the more conventional radio frequencies. In use in tactical missiles, it is envisioned that the missile's internal computer would compare the ladar returns with prestored target reference data to select an enemy target without the need for an operator to designate it, thus reducing personnel exposure to hostile fire.

The contract calls for a 12-month study, including mission definition, system requirements and technology assessment and demonstration activities to reduce development risk.

The final part of the study will be a hardware development plan, which may be used by the Air Force in formulating any future hardware demonstration programs.

## Anderson in Sea Fury Wins Reno Unlimited Class Championship

Neil R. Anderson, Fort Worth's Director of International Flight Evaluation and Engineering, won the Unlimited Class championship of the Reno National Championship Air Races last month in a modified World War II-era aircraft.

Anderson flew the Dreadnought, a Hawker Sea Fury which was powered by a 28-cylinder, 4,500-horsepower Pratt & Whitney R-4360 radial engine taken from a C-124 cargo plane.

The Reno meet was Anderson's and the airplane's first air race.

The race's eight laps were flown around nine pylons in a 9.1-mile egg-shaped course. Anderson's winning average speed was 425.242 mph, not much below the record 433.010 but well above last year's winning 405.092.

The Dreadnought's qualifying lap speed was 446.392 mph, the fastest of all entrants. The races took place over three days and included other events of six laps around the course. In one of the early heats, Anderson set a six-lap Reno course speed record of 435.584 mph.

Second, third and fourth places in the Unlimited Class were won by P-51

## William Mullins Appointed Staff Vice President

William H. L. Mullins has been promoted to Staff Vice President reporting to Edward J. LeFevre, Corporate Vice President - Government Relations. Mullins will continue to be based in the Washington, D.C., Office.



Mullins

A retired U.S. Air Force Brigadier General, Mullins was graduated from the U.S. Military Academy in 1957. He also received a Master of Business Administration degree from the University of Arizona in 1967. As a fighter pilot, he served in Southeast Asia in 1967 and 1968 and flew 146 combat missions, 116 of them over North Vietnam. His awards include the Distinguished Flying Cross with four Oak Leaf Clusters, the Bronze Star and the Air Medal with 12 Oak Leaf Clusters.

## Trident, 688-Class Submarines Named Nevada, Augusta

The Navy recently assigned names to two submarines under construction at Electric Boat.

SSBN 733, the eighth *Ohio*-class (Trident) submarine, has been named *Nevada*. The fast-attack submarine SSN 710, 18th of the SSN 688-class to be built at Electric Boat, will carry the name *Augusta*, after the capital of Maine.

Two previous Navy ships have honored Nevada. The first was a monitor commissioned in 1903 and renamed in 1909 to clear the name for a battleship.

The second, the battleship BB36, which was built at Quincy, is remembered for being the only battleship to get under way during the Japanese attack on Pearl Harbor on December 7, 1941. She sustained heavy damage, but later, repaired and modernized, she went on to earn seven battle stars during World War II.

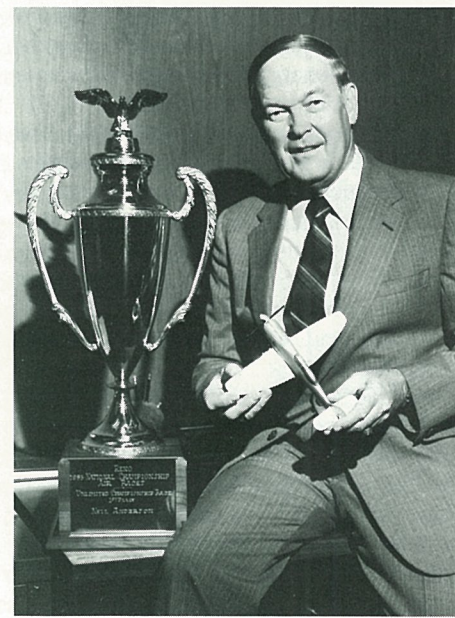
The name *Augusta* has been carried by four previous U.S. Navy ships. The first three were a 14-gun brig (1799-1801), a sidewheel gunboat (1861-1888) and an armed yacht, SP946 (1917-1918).

The fourth *Augusta* was the heavy cruiser CA31 (1931-1959), which served as one of the meeting places for President Franklin Roosevelt and British Prime Minister Winston Churchill during the famous "Atlantic Charter" conferences in the summer of 1941. She went on to win three battle stars for World War II service.

Mustangs, which the two-cockpit Dreadnought outweighs by approximately 3,000 pounds. The class also included F8F Bearcats and P-38 Lightnings.

Anderson said, "The Dreadnought's rebuilders at Sanders Aircraft in Chino, Calif., wanted a test pilot to evaluate the plane because its front end had to be modified tremendously to add the larger engine," he explained. "The aircraft handles somewhat differently from other Sea Furies, and Sanders wants to use it for research as well as racing."

The Sea Fury that became the Dreadnought was originally built in 1946 and was shipped from Burma for rebuilding. Hawker Sea Furies were used as Royal Navy carrier fighters and pilots flying the aircraft shot down several MiGs in the Korean War.



**Top Air Racer.** Neil R. Anderson, Fort Worth Director of International Flight Evaluation and Engineering, is shown with the trophy he won in the Reno Air Races. He is holding a model of the airplane he was flying, the Dreadnought, a highly modified Hawker Sea Fury.

## Tara Weidhuner, 10, Stars on National TV For Arthritis Group

Ten-year-old Tara Weidhuner of Athens, Ill., has costarred with actress Victoria Principal in making taped television public service announcements for the National Arthritis Foundation.

Tara, who suffers from juvenile rheumatoid arthritis, is the daughter of Ronald and Karen Weidhuner. Weidhuner is a Material Service employee who works as the Production Coordinator for the Athens Stone Quarry. Miss Principal, whose parents are afflicted with arthritis, is the foundation's National Chairman.

Tara and her parents were flown to Los Angeles recently to make the series of commercials. While there, they visited Disneyland, Universal Studios and Miss Principal in her home.

The fifth-grader and her parents are active in the Central Illinois Chapter of the Arthritis Foundation. As chapter chairman, she appeared on local segments of foundation telethons. After tapes of her telethon appearances were sent to the foundation's national headquarters in Atlanta, Ga., she was selected to star in the national commercials with Miss Principal.

## Design Contract

The U.S. Navy awarded Electric Boat a \$62 million contract for the partial redesign of Trident submarines.

The new design will permit the submarines to carry the Trident II (D-5) missile now being developed.

The changes will be incorporated in the ninth Trident submarine, which is now in production.

## New Compact Reader In Microfiche Line

Datagraphix has introduced the Data-MATE™ 475, a compact microfiche reader designed for viewing both computer output microfilm and source document microfiche at three-fourths original size.

The newest addition to the Datagraphix family of microfiche readers features a precision optical system that assures uniform image contrast and clarity in high ambient light conditions. A floating objective lens block maintains constant frame-to-frame focus.

Other advanced design features include a rapid opening glass platen magnetic grid index and a ball and track fiche carriage that glides effortlessly in any direction across the film plane. An electro-optical component drawer provides a safe, simple means of lamp replacement, assuring easy access for trouble-free performance.





**Animation.** Anna Marie Jackson, daughter of the late Senator Henry M. Jackson, showed considerable enthusiasm when she christened a Trident submarine in her father's honor. Shown with Miss Jackson in the center photo are Adm. Hyman G.

Rickover, USN (Ret.), Father of the Nuclear Navy, and Mrs. Helen Hardin Jackson, the Senator's widow. Shown with Miss Jackson in the photo at right is David S. Lewis, Chairman and Chief Executive Officer of General Dynamics.

# GD World

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November 1983

## Third Quarter Earnings Set Record

General Dynamics on November 10th announced that net earnings in the third quarter and first nine months of 1983 were \$76.7 million, or \$1.43 per share, and \$206.2 million, or \$3.78 per share, respectively, on sales of \$1.7 billion and \$5.3 billion. The earnings for both periods are the highest in the company's history.

Net earnings from continuing operations in the third quarter of 1982 were \$56.7 million, or \$1.03 per share, on sales of \$1.5 billion, and for the first nine months of 1982 were \$96.4 million, or \$1.75 per share, on sales of \$4.3 billion. The nine-month 1982 results were impacted by a write-off of \$56 million (\$1.03 per share)

for shipbuilding cost overruns taken in the second quarter. Net earnings for the third quarter and first nine months of 1982, including discontinued operations, were \$51.4 million, or 94 cents per share, and \$68.7 million, or \$1.24 per share, respectively.

Funded backlog at the end of the 1983 third quarter was \$14.6 billion, and funded and unfunded backlog was \$18.2 billion.

"The 1983 results reflect the continuing good performance on our major manufacturing programs involving F-16 fighters, Trident submarines and main battle tanks,

*Continued on Page 2*



**Leadership Award.** A Distinguished Achievement Award for 1983 was presented to David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, by The Wings Club in ceremonies last month in New York. At left is Frederick R. Einsidler, President of The Wings Club, who presided at the award program, and at right is Dr. Walter M. Hartung, Chairman of the Awards Committee.

## Wings Club Honors D. S. Lewis

David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, received a Distinguished Achievement Award for 1983 from The Wings Club at the organization's 41st Annual Dinner Dance in New York City October 25th.

Lewis was cited for "his executive guidance of the General Dynamics Corporation associated with the design and construction of modern supersonic fighter aircraft," particularly the F-16 Falcon.

The award program was designed as a tribute to the chairmen and chief executive officers of four American aerospace companies for their roles in developing the contemporary front line supersonic fighters. In addition to Lewis, Distinguished Achievement Awards were given to John C. Bierwirth of the Grumman Corporation, Sanford N. McDonnell of the McDonnell Douglas Corporation and Thomas V. Jones of the Northrop Corporation. They were honored for their work with the F-14 Tomcat, F-15 Eagle and F-5 Freedom Fighter, respectively.

Paul Thayer, Deputy Secretary of Defense and keynote speaker for the event, praised the four award recipients and aerospace leaders in general, saying, "America's aerospace leaders are forever seeking new

challenges and new worlds to explore. It is good that America has such visionary leaders and that America has, therefore, remained in the forefront of aerospace technology."

*Continued on Page 4*

## Trident Submarine Christened To Honor Henry M. Jackson

Praise and youthful exuberance marked the October 15th christening of the nation's fifth Trident submarine, *Henry M. Jackson* (SSBN 730), at Electric Boat's Groton, Conn., shipyard.

The praise, directed toward the late Senator from Washington for whom the 560-foot-long submarine was named, came from several persons, one of whom was John F. Lehman, Secretary of the Navy and the principal speaker at the ceremony.

In addressing the crowd of 3,000 spectators and guests at the event, Lehman called Jackson "a very special hero." "The ballistic missile programs in all services are due more to 'Scoop' Jackson's leadership in Congress than any other factor," he said.

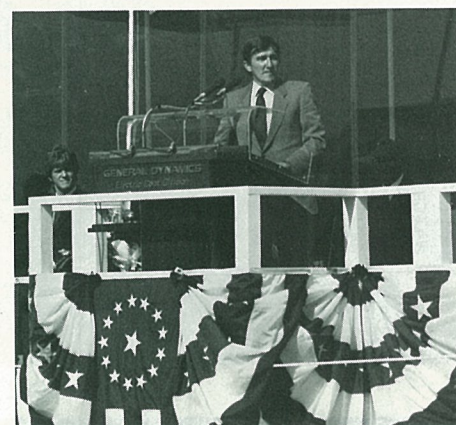
Lehman said that the "very nuclear program upon which the most secure leg of our deterrence is based was the product of the legislative efforts of Henry Jackson."

The Secretary was referring to Jackson's role as the principal Congressional advocate and sponsor of the Trident ballistic missile submarine program. Jackson, who died September 1st, was the ranking Democrat on the Senate Armed Services Committee and former Chairman of its Arms Control Subcommittee. He was a leading proponent of a strong defense posture throughout his 43-year career in Congress.

The youthful exuberance was displayed by the boat's sponsor, Anna Marie Jackson, the Senator's daughter. The Stanford University student's powerful swing in smashing a bottle of champagne on the after edge of the superstructure sent a sheet of bubbly spray over her and those gathered nearby. Then, hands in the air, she jumped enthusiastically, obviously pleased with her performance.

Peter Jackson, the Senator's son, spoke for his family, remembering his father for his "constant optimism" and fascination with history. His father stood for justice and peace, he said, and "the necessity of protecting and promoting these humane values."

Jackson's widow, Mrs. Helen Hardin Jackson, attended but did not speak at the christening.



**Speakers.** John F. Lehman, Secretary of the Navy, addresses the crowd. Seated at left is Peter Jackson, son of Senator Jackson, who spoke for the late Senator's family.

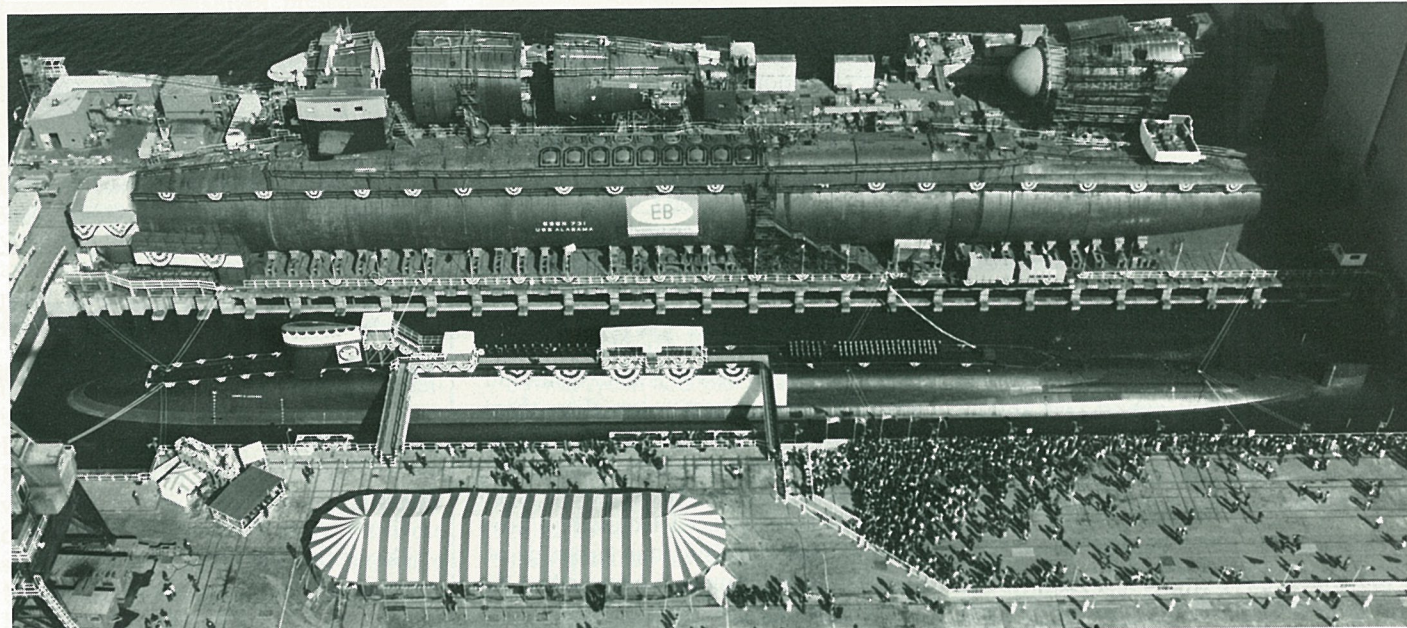
David S. Lewis, Chairman and Chief Executive Officer, said that the submarine, which floated in a huge graving dock at the shipyard for the ceremony, "honors a man who worked untiringly" to maintain the country's defenses.

Representative Norman D. Dicks, Democrat of Washington, spoke for the Washington State Congressional delegation and called Jackson "a shining example of what it is to be a public servant. He was for me an effective and understanding teacher on the issues of the day."

William Clark, former National Security Advisor to President Ronald Reagan, was originally scheduled as principal speaker. However, he was named by the President as Secretary of the Interior the day before the submarine's christening and was unable to attend. Clark's wife, Joan, read a letter from President Reagan calling the *Henry M. Jackson* an especially significant ship, which "is a fitting monument to him and will carry on his lifelong quest for peace."

The *Henry M. Jackson* is the only submarine in the *Ohio* class to bear the name of a person. Others are named for states. The ship had originally been designated as the *Rhode Island*, but President Reagan ordered the name changed shortly after the Senator's death.

Electric Boat has delivered three of the huge submarines and has seven more in various stages of construction.



*The Henry M. Jackson as Crowds Begin to Gather Prior to Her Christening*



## F-16 Units and Pilots Win Top Honors at USAF's Gunsmoke '83

The 50th Tactical Fighter Wing team from Hahn AB, West Germany — equipped with F-16 Falcons — was the overall winner of the two-week Gunsmoke '83 tactical gunnery and bombing competition held last month at Nellis AFB, Nev. The 388th TFW from Hill AFB, Utah, another F-16 unit, placed second.

The title of Top Gun was taken by Lt. Col. Roy Neisz, an F-16 pilot from the 388th TFW. The runners-up also were F-16 pilots. Capt. Edward L. Furtado from the 50th TFW placed second, and Capt. Marc L. Fielder of the 388th TFW came in third.

Approximately 800 U.S. Air Force aircrew and groundcrew members and 80

tactical fighter aircraft from 16 Air Force units in the United States and around the world competed in the prestigious event. Other aircraft types in Gunsmoke '83, besides the F-16, were the A-7 Corsair II, A-10 Thunderbolt II and F-4 Phantom II.

Aircrews were judged in three events: basic weapons delivery, tactical bomb delivery and navigation/attack. Maintenance crews were evaluated on maintenance effectiveness throughout the competition. Munitions crews participated in "loados," which measured proficiency in loading weapons onto aircraft. Points were subtracted for infractions from a perfect starting score in all events to determine total scores.



Top Gun Lt. Col. Roy Neisz in F-16

## Third Quarter Earnings Set Record

Continued from Page 1

and the steady buildup in production levels on a number of tactical missiles and gun systems and the Tomahawk cruise missile," said David S. Lewis, Chairman and Chief Executive Officer. "Fort Worth and the F-16 are again leading the way and the future for this superb fighter looks brighter than ever."

During the third quarter, three foreign countries announced plans to order a total of 259 F-16 Falcons, valued at more than \$6.5 billion. These include an initial purchase of 160 aircraft by the Republic of Turkey, and follow-on buys of 75 by Israel and 24 by Norway.

"The F-16 program remains on cost and on schedule with more than 1,050 aircraft now delivered to U.S. and allied air forces," Lewis said. "To date, eleven countries have selected the F-16 as their first-line fighter-attack aircraft and have indicated firm requirements for more than 3,000 Falcons."

At Electric Boat, the Trident ballistic missile submarine *Georgia*, the fourth ship in this class, recently began sea trials and a fifth, the *Henry M. Jackson*, was launched last month. Five other Tridents on order are in various stages of construction. The SSN 688-class submarine *Portsmouth* was delivered to the Navy eight weeks early and became the fifth successive submarine to be completed ahead of schedule. The *Hyman G. Rickover*, 17th submarine in this fast-attack class to be built by Electric Boat, was launched in August. Seven other 688s are in various stages of construction.

Quincy Shipbuilding is well along in the construction of five Maritime Prepo-

sitioning Ships for the U.S. Navy, two of which had their official keel-laying ceremonies in September.

Land Systems maintained its on-schedule position on the important M1 main battle tank program by delivering a total of 189 M1s to the U.S. Army during the third quarter. As of November 1st, 1,429 M1s had been delivered to meet the requirements of the U.S. Army. Production of the battle-proven M60 tank continued at a rate of 30 per month and additional orders are expected from allied countries that would extend M60 production well into 1985.

Earnings for the 1983 third quarter and the first nine months at Convair and Pomona were up substantially over the year earlier periods. Highlights at these divisions included a number of successful flight tests of Convair's Tomahawk cruise missile and important new orders for several Pomona-built missiles and gun systems, including a \$50 million award for initial production of the Stinger-POST anti-aircraft missile.

The Electronics Division performed well during the quarter and won a competition to design and build avionics test equipment for the B-1B strategic bomber. This award is valued at more than \$100 million.

Lewis said that the company's commercial operations — Material Service, El Paso Sand Products, Marblehead Lime, Freeman United Coal Mining and Data-graphiX — were profitable during the quarter despite continuing difficult economic conditions affecting their markets.

## D. S. Lewis Nominated for Cessna Board; Joint Technology Program Planned

Cessna Aircraft Company's Board of Directors has nominated David S. Lewis, General Dynamics Chairman and Chief Executive Officer, to succeed Delbert L. Roskam, who is retiring after 27 years as a Cessna board member.

If elected by Cessna's stockholders, Lewis will become a member of the board December 13th at the company's annual meeting of shareholders in Wichita, Kan.

Cessna and General Dynamics also announced a joint advanced technology program which will include research and development in the areas of composite

structure, aerodynamics and flight control systems for high performance aircraft.

In addition, Cessna has agreed to sell 500,000 shares of Cessna Common Stock to General Dynamics for \$12.7 million. The sale of the newly issued Common Stock, which represents less than three percent of total shares outstanding, will be made at \$25.40 per share.

Cessna Chairman Russell Meyer said details of the advanced technology program are being defined and proceeds of the stock transaction are expected to be used to fund Cessna's participation in the joint research and development projects.

## Around the World... ..in GD

**CHQ:** John J. Irons joined as Corporate Manager-Military Space Programs... Frank M. Timinsky, Jr. was promoted to Subcontract Audit Manager.

**Fort Worth:** Thomas D. Brown, G.D. Higgins and Billy R. Reyes were promoted to Material Planning Supervisor... Patrick D. Bobbitt and J.W. Underwood to Production Specialist... Charles C. Burke to Project Manager... Jerry L. Cogdill to Senior Program Analyst... Winston S. Coley, Frederick Fass and Jan R. Thompson to Logistics Engineer... John L. Evans to Manager of Quality Assurance... Dexter Gatlin and Albert G. Truett, Jr., to Material Program Administrator... Jerry D. Helm to Industrial Engineering Specialist... Jimmy D. Hester to Material Stores Supervisor... Thomas N. Jumes to Engineering Administration Group Supervisor... Dennis J. Lasater, Richard D. McArdle, Theodore Ovalle, Kenneth L. Robinson and Neill M. Seaver to Field Service Engineer... Gary W. Lowe to Contract Administrator... Steven J. Matthews to Manufacturing Control Supervisor... James A. McKinney to Marketing Manager... Gordon L. Peterman to Chief of Quality Assurance... Fred W. Robeson to Engineering Group Supervisor... Donald A. Sabo to Assistant Project Engineer... Richard L. Stapp to Project Coordinator... Gary L. Stevens to Chief of Estimating... Noland B. Turner to Field Engineer.

**Convair:** Daniel L. Bergen and Robert D. Williams, Jr., were promoted to Group Engineer-Quality Assurance... Charles M. Gauss, Jr., Donald E. Watson and Darwin R. Wirth to Estimating Chief... Carlos V. Martinez to Operations Supervisor-Manufacturing Engineering... Steven A. Kewley to Drafting Supervisor... Salvatore A. Toro to Operations Supervisor-Manufacturing... Robert T. Tuttobene to Base Manager.

**Electronics:** Paul Bokros was promoted to Director of F-16/B1 ATS Engineering... Katherine T. Cox to Operations Section Head... Roger W. Danielson to Purchasing Agent... James R. Dawson to Program Manager... Richard L. Engel to Manager of Procurement Support and Administration... Carl H. Gassoway to Director of F-16/B1 Productions... Patricia A. King to Technical Supervisor... James G. Pullen to Manager of DLMF... Richard J. Walter to Manager of Contracts... William J. Weedon to Technical Supervisor... Jack L. Woods to Programs Director B1 IATE.

**Pomona:** John J. Dziuban, Linda K. Carter and Henry G. Molina were promoted to Design Specialist... Harold W. Heitz, Thomas E. Holtz and Robert J. Pierce to Purchasing Agent... Martin J. Carter to Plant Engineering Supervisor... Kevin P. Daugherty and Ronald E. Smith to Plant Engineering Chief... Norman T. Enders to Logistics Representative... Terri R. Feulner to Pre-Manufacturing Engineering Chief... John W. Marti to Senior Cost Control Analyst... Edward Miyashiro to Section Head... Raymond L. Ottaway to Production Support Manager... Rodney J. Peterson to Senior Project Engineer... Vincent S. Borsattino to Senior Design and Construction Engineer... George A. Cerisara to Group Engineer... Bernard M. Cestone to Design Engineering Director... John L. Cox to Senior Field Service Representative... Gary L. Hastings to Procurement Program Administrator... Velna J. Mathis to Specifications Analyst... Steve Nwranysky to Senior Manufacturing Engineer... Edward E. Parsonage to Manufacturing and Material Control Chief... Kent R. Porter to Hourly Staffing Supervisor... Barbara J. Ross to Superintendent... Timothy D. Vayhinger to Program Administration Manager... David E. Wilson to Senior Electronics Engineer... James A. Wilson to Accounting Coordinator... John A. Young to Staff Engineer... Jackie O. Flint to Material Liaison Representative... Carmichael D. Crutchfield to Subcontract Administrator... Leroy A. Howard and Helen White to Senior Buyer... Benny B. Cole to Procurement Quality Assurance Manager... Lottie E. Hinton to Material Requirements Supervisor... Emma L. Robinson to Material Control Supervisor... Margaret J. Parker to Manufacturing I Supervisor... At Camden, David M. Sodman to Manufacturing Manager.

**Land Systems:** Gary S. Modrak, Michael L. Foos and Joseph W. Muniz were promoted to Senior Quality Assurance Engineer... Spurgeon C. Keith to Manufacturing Technology Chief... John F. Heasel to Senior Management Systems Analyst... William P. Ting to Assistant Marketing Director... Kenneth R. Trego to Maintenance Foreman-Skilled Trades... John D. Szuch to Production Planning & Control Supervisor... Steven A. English to Senior Material Planning Analyst... John M. Shuka III to Accounting Supervisor... Gregory J. Billington to Maintenance Superintendent... Thomas G. Brown to Plant Services Manager... Dewey E. Brown to Program Management Chief... George F. Claybaugh to Material Control General Supervisor... Dominic A. DeMello and Robert J. Fey to ILS Field Operations Chief... James Bierman to Logistics Engineering Supervisor... Kenneth A. Ziglar to Chief of Engineering... Daniel W. Redmond to Skilled Trades Inspection Foreman... Robert C. Wagner to Engineering Supervisor... John J. McCuen to ILS Manager... Raymond B. Paver to Engineering Manager... Marion L. Smith to Production Planning Specialist.

**DSD:** At Home Office, Frederic Sussman joined as Senior Administrative/Financial Analyst... Donald C. Bowen was promoted to Purchasing/Material... At Western Center, Daniel A. Paukovec transferred from Home Office and was promoted to Business Systems Development Supervisor.

## Savings and Stock Investment Values

	September 1981	September 1982	September 1983
<b>Salaried</b>			
Government Bonds	\$ 2.6551	\$ 3.1786	\$ 3.5559
Diversified Portfolio	1.9331	2.1060	3.1968
Fixed Income	1.2494	1.3912	1.5588
<b>Hourly</b>			
Government Bonds	2.6522	3.1762	3.5541
Diversified Portfolio	1.9745	2.1497	3.2628
GD Stock	\$22.2500	\$32.5000	\$53.6250



## De Blanc, Cohan Named Directors

John De Blanc has been promoted to Director-Program Development Services and Christopher Cohan has been pro-



De Blanc



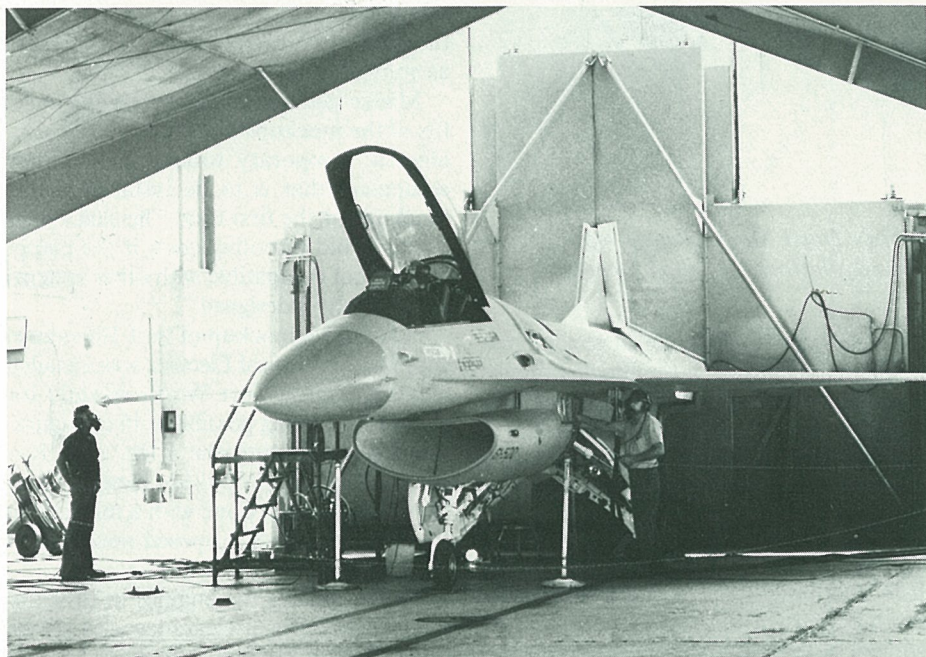
Cohan

moted to Director-Advanced Programs Engineering at Convair.

De Blanc, who was Manager-Program Development Services, joined Convair in 1955 as an engineering aide and technical

writer and, following two years' service in the U.S. Air Force, returned to the company in 1960. Since that time he has served in a series of communications and proposal development positions with the Convair, Electronics and former Astronautics divisions. He holds a Bachelor of Arts degree in History and English from San Diego State University.

Cohan has been with Convair since 1957, immediately following his graduation from Notre Dame University, where he earned both Bachelor and Master of Science degrees in Aeronautical Engineering. He held a succession of design and engineering positions, including his previous position of Engineering Manager.



**Quite Quiet.** Technicians at Fort Worth's "hush house" prepare an F-16 for an engine run. Panels fit around the aft fuselage of the aircraft and contain the sound of the engine running at full power.

## F-16 Engine Test Noise Reduced By 'Hush House' at Fort Worth

Using an acoustically designed structure called the "hush house," Field Operations personnel at Fort Worth can test F-16 engines at full power any time of the day or night without disturbing residents who live near the plant.

Fort Worth's flight line has 33 other engine run stations that consist of hangars with sound-absorbing walls. The hush house is located at the end of the row and consists of a covered area backed by a tunnel-like muffler chamber.

"For engine testing, an F-16 is backed into the sheltered area until the tail enters the opening of the chamber," said Ben Dunsworth, Field Operations supervisor in charge of the hush house on the day shift. "The upper part of the opening is shaped like a cross section of the F-16 vertical stabilizer so that the rear of the aircraft, including the engine nozzle, can be completely enclosed. Movable panels are shut around the aft fuselage and horizontal stabilizers," he explained.

The muffler portion of the hush house is approximately 20 feet long and has double partitions on both sides. Between the insulated partitions is air that helps absorb engine noise.

The muffler cylinder, which is large enough for an adult to crawl through, contains a perforated baffle similar to the inside of an automobile muffler. The cylinder terminates in a closed cubicle with a vented roof; the vents allow exhaust fumes to escape.

"The house is also equipped with a forward-muffler device that is mainly used at night. It can be moved in front of the aircraft to suppress the high-pitched whine

emitted from the engine air intake," Dunsworth said. "With the forward section in place, engine sound is reduced to approximately one third of what can be heard outside one of the hangar run stations."

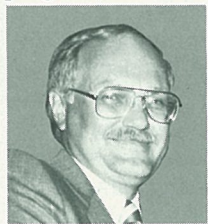
Alongside the hush house is an insulated room called the "block house" where Field Operations employees monitor muffler chamber temperatures during engine runs.

Each new engine receives a 30-minute "green run" the first time it is started. An additional test is the "trim run," in which the engine is operated for 15 minutes at various speeds from idle to full afterburner.

F-16s are held stationary with a tail hook and wheel chocks while their engines are being tested.

## Vern David Named Employee of Year

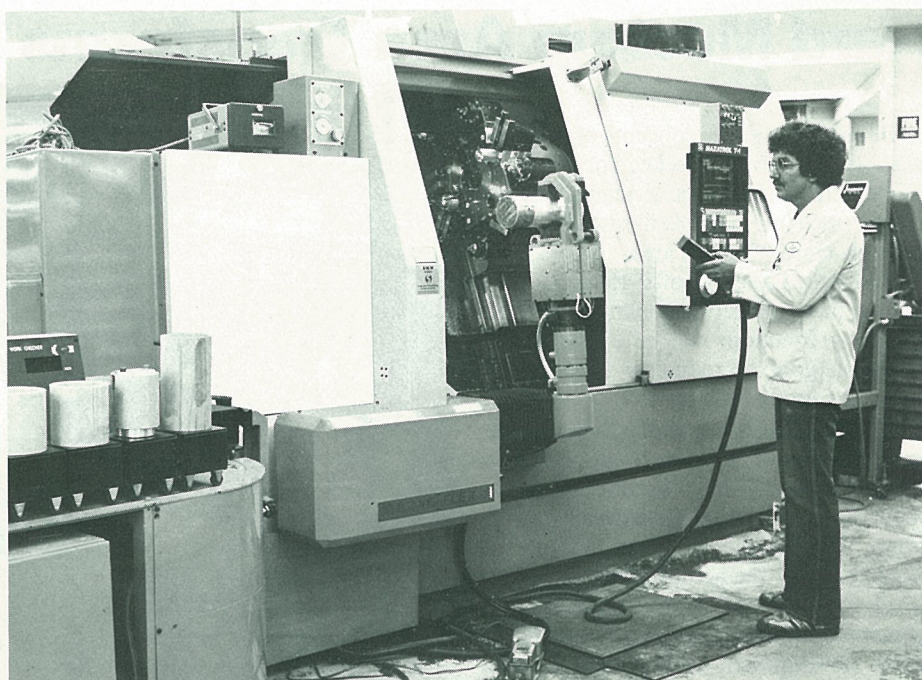
Vern H. David, Manager of Quality Assurance for Convair's Cruise Missile program, has received the General Manager's EXCEL Award as Employee of the Year for 1982.



David

In presenting the award, John McSweeney, Vice President and Convair General Manager, cited David's contribution to the division in coordinating the management activities concerned with revitalizing the Quality Assurance Program and the many presentations to the Department of Defense which resulted in the Department's approval of the program.

David has been with Convair since 1968 in a series of responsible positions specializing in quality assurance and engineering. He received a Bachelor of Arts degree in Mathematics and Statistics from the University of Wyoming in 1964 and a Master of Science degree in Statistics from the same school in 1968. He also earned a Master of Science degree in Systems Management from the University of Southern California in 1975.



**Modern Machine.** Joe Diaz, a machinist, "teaches" the robot on a new numerical control flexible turning center to recognize one of the parts to be machined to a particular size and shape. The turning center is one of several machines added to the Electronics Division's machine shop in a modernization project.

## Electronics Division Adds Computer Control in Machine Shop Project

Electronics Division has completed a computer numerically controlled machine shop modernization project in its Kearny Mesa plant, replacing equipment that in some cases was several decades old.

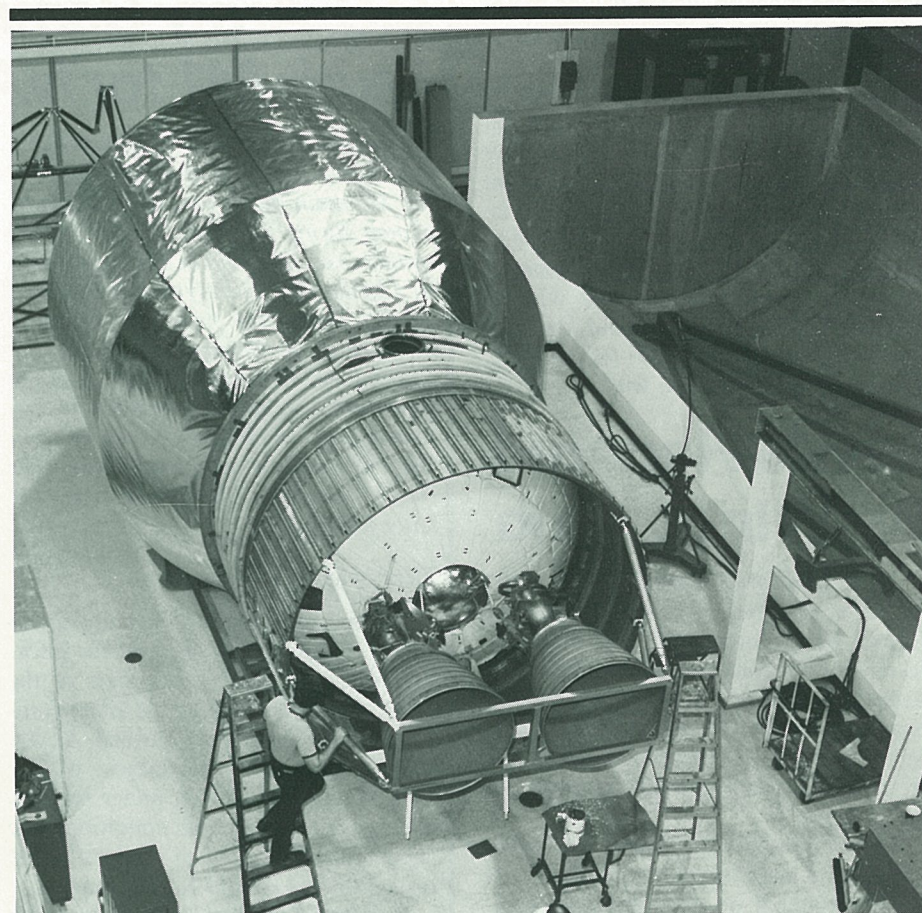
Among the new machines are computer-controlled horizontal and vertical milling machines, capable of handling up to 80 tools and automatically producing finished pieces from raw stock.

Another machine, a flexible turning center, features an attached robot with a work piece recognition system that determines the proper numerical-control computer program based on the shape and size of the work piece presented. Ron Sumner, Director of Metal Fabrication, said the robot also sets the stock in place from the carousel to the work area, and

removes and turns it to finish both ends. "The robot is capable of recognizing and loading up to 20 different part numbers into the machine and automatically processing them into finished parts," Sumner said.

In addition to the robot turning center, Sumner said the new shop has a second flexible machining module, a six-pallet, shuttle-loaded horizontal milling center, six additional computer numerically controlled milling machines and four computer-aided manufacturing programming terminals.

"The new shop is a part of the on-going effort by the company to improve productivity and quality in all of its operations," Sumner said.



**Shaping Up.** The mockup of the wide-body Centaur G-Prime upper stage, which will launch two NASA payloads from the Space Shuttle in 1986, is taking shape at Convair's Kearny Mesa plant. To the right of the Centaur G-Prime mockup is a mockup of the Shuttle's cargo bay. General Dynamics and NASA recently signed a \$253-million contract to develop, test and deliver the two upper stages.

## Allen and Durham Win Tennis Tourney

Lytton Allen and Bill Durham, a doubles tennis team representing General Dynamics, won the St. Louis regional competition of the National Holiday Inn Corporate Invitational tennis tourney October 23rd.

They qualified for the Corporate Invitational finals, to be held in Memphis, Tenn., in February 1984, by beating a team from South Central Bell, of Birmingham, Ala.,

6-4 and 6-2 in their last match. They previously had beaten three other teams in the regional tourney.

Allen and Durham, employees from Data Systems' Central Center at Fort Worth, earned the right to represent General Dynamics by winning a company-wide competition at Fort Worth in September.

# GD World

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# Hard Mockup Area Transforms Paper Concepts into Hardware

By Joe Stout

In order for paper concepts of new aircraft systems to be checked for compatibility with the rest of the airplane, they are transformed into tangible hardware in Fort Worth's Hard Mockup area.

Full-scale mockups of F-16 aircraft are built so that engineering, tooling and manufacturing functions can be united in the common goal of reducing development costs and production times.

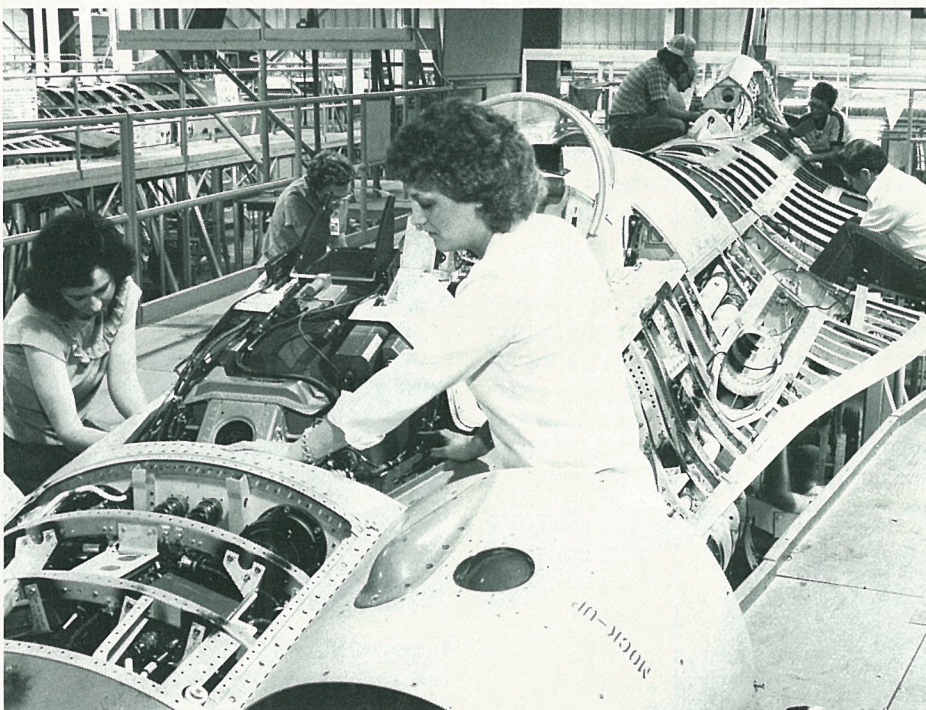
When engineers began planning the integration of avionics components designed for F-16C and F-16D aircraft under the Multinational Staged Improvement Program, they installed replicas of the components — or the actual hardware, when available — in the F-16C mockup that personnel in the area have been assembling since development of the new aircraft model began.

This hands-on approach enabled them to determine the most practical locations for the components and the best routing for the complex wiring that connects the components to aircraft controls, power sources and other systems. Two of the major considerations were accessibility for maintenance and the prevention of interference with other components.

After the final wiring arrangements were approved by the engineers and by Quality Assurance representatives, the components and wiring were removed from the mockup for use as masters for fabrication of tooling. Assemblers measured wire lengths and branch-offs and transcribed them on tooling boards. Metal pegs were then mounted on the boards for wiring to be stretched over during harness assembly, and appropriate documentation was affixed.

The boards will be used in the manufacture of each production harness of their particular configuration. The first production harness assembled with each board will be installed in the F-16C mockup to verify that all dimensions fit correctly. The harnesses will then become a part of the mockup, which will be maintained by Fort Worth throughout the service life of F-16C versions.

"Our F-16C mockup is now about 99 percent complete, which means that the equipment you see on the mockup is pretty much what will be on the first production F-16C when it rolls off the assembly line in 1984," said Carl Jettun, Senior Tooling Engineer. "The mockup will never be 'finished,' though, because it will be changed as long as updates and improvements are being made to F-16C aircraft. We are doing this now with our F-111



**Full-Scale Mockup.** Employees in Fort Worth's Hard Mockup area work on an F-16C fuselage mockup which is set on a raised platform to allow access to the underside of the aircraft structure.

mockups as new F-111 systems are introduced."

Jettun said a mockup has been made of every type of aircraft produced at Fort Worth, from the B-36 on.

Six F-16 mockups are currently being used at Fort Worth: four for different production sequences of the "A" configuration, one for the F-16C and one for the F-16D. The F-16C and one of the "A" mockups include the complete fuselage structure. The others are of the forward sections only, since the aft components for all "A" aircraft are essentially alike, as are the aft components for "C" and "D" aircraft. There are three different wing mockups in the Hard Mockup area.

All access panels and skins have been removed from the mockups so that internal aircraft structures can be seen.

"We always maintain the latest configuration," said Jettun, "so the Block 1 mockup incorporates every change that has been made to the first production F-16s. But if necessary, we can also go back to some degree and replicate the original configuration."

Florren Mielke, Lead Engineer of the F-16 Thermodynamics Group, which uses the mockups in planning environmental control system installations, explained the mockups must be up to date to be useful in systems design.

"Otherwise," Mielke said, "you'd proof the design with the mockup and put it into production only to find that its placement interfered with some other item that had been added or modified at some time. The time that would have to be taken for

redesign would greatly impact the production schedule."

"Hydraulic plumbing installation is planned with the mockups in much the same way wire routing is, and the mockups are also used by propulsion, fuel and structural engineers," Jettun said.

Draftsmen use the mockups for reference when making engineering drawings, and writers of Technical Order manuals regularly refer to them. The mockups also are used by field service engineers and U.S. and allied military personnel who are taking F-16 maintenance courses at the Logistics Department's Support Training Center.

Vendors who are designing aircraft components to Fort Worth specifications use the mockups for reference in the same way as company engineers.

Mielke said one of the cost-saving benefits of the mockups is in tooling. "We usually use temporary tooling to fabricate equipment that is to be installed in the mockup for the first time," he said. "This lets us avoid retooling costs if the equipment is not compatible with other systems and must be redesigned."

A full-scale mockup of an F110 engine, supplied by General Electric, was installed in a mockup at Fort Worth recently for studies concerning possible F-16 configurations incorporating the F110, said Ray Turner, Chief of Propulsion Design. Similar work has been done with a mockup of Pratt & Whitney's proposed new-version F100 powerplant.

"We're putting the engines in to verify that there is proper clearance with all the other aircraft systems," he said. "If you only have drawings to go by in a high-density aircraft like the F-16, it's difficult to get all the equipment in without overlooking something."

## USAF Selects Stinger for Air Base Defense

The Pomona-produced Stinger missile has been selected by the U.S. Air Force as a ground-based point air defense weapon. The shoulder-launched, fire-and-forget missile is effective against high-speed maneuvering aircraft or attacking helicopters.

An Air Force spokesman at Eglin AFB, Fla., said that plans call for initial delivery of 216 units for use by Security Police ground-based defense elements. The U.S. Army will provide Stinger logistics and training for these units.

Stinger employs a passive infrared seeker and proportional navigation system. The missile contains a high-explosive, hit-to-kill warhead, an electric control system and a dual-thrust rocket motor. It includes a separable electric gripstock which launches the missile. A successor to the Redeye weapon system, Stinger can be stored for 10 years without performance degradation.

## Tomahawk Flies Mission After Vertical Launch

A Convair-built Tomahawk cruise missile successfully demonstrated its vertical launch capability recently in a test flight conducted over the Pacific Missile Test Center's Test Range off the coast of Southern California.

In the test, a preproduction model of a surface ship's Vertical Launch System, installed at the test center, was used to launch the missile. Following launch, the missile transitioned from vertical flight to cruise flight and flew a simulated land-attack mission over San Clemente and San Nicholas Islands before being successfully recovered at San Clemente Island.

The test was the first from a shipboard vertical launch system module using the operational launch profile. Vertical launch systems are scheduled to be installed on CG-47 class cruisers and DD-963 and DDG-51 destroyers beginning in mid-1986.

## U.S. Army Commander in Europe Lauds M1 for NATO Performance

*Gen. Glenn K. Otis, Commander of U.S. Army Forces, Europe, has praised the M1 main battle tank for its performance during Reforger '83, the NATO combat exercises held in late September. In a letter sent recently to Senator Carl Levin, Democrat from Michigan, a member of the Senate Armed Services Committee, Otis said the M1 "was the best tank on the battlefield" in the maneuvers, which involved tanks from West Germany, Great Britain and other NATO countries. The full text of Otis' letter follows:*

Dear Senator Levin:

Let me take this opportunity to respond to your recent request for information about the performance of the M1 main battle tank in the latest combat exercises in Western Europe. As you know, Reforger is the largest of our annual exercises to test, under realistic and fast-moving combat conditions, the capabilities of American military forces tasked to help defend NATO Europe.

Reforger '83, just held September 19-29, was the second in which the M1 participated, and I am happy to report that the tank's performance this year again demonstrated the outstanding performance qualities which were manifested during '82. This year, 53 M1s of the First Squadron, 11th Armored Cavalry Regiment participated, with the following excellent results:

Even though the unit is the latest to receive M1s, and thus has had only limited operational experience with the tank, the M1 was able to demonstrate a 98 percent operational readiness/availability rate for the entire exercise period. At the end of the 11-day, intensive exercise, in which each tank averaged almost one-third to one-half of its total annual

miles operated in Europe, all 53 M1s remained operational.

Tactical performance again was superior, with the increased speed, cross-country mobility, target acquisition, and night fighting capabilities of the M1 providing the squadron with marked advantages over its opposing forces.

AGT 1500 tank turbine engine performance was excellent, with only two engine-related failures: the replacement of one reduction gear box and one engine rear module. This is equivalent to replacing about half an engine, so that no entire engine from the supply system was consumed. (This also demonstrated the worth of the M1 engine's 'modular replacement concept' for increased maintainability and logistics supportability, since tank diesel engines must be completely replaced if they fail.)

All maintenance work during the exercise was accomplished by elements of the squadron's Direct Support Maintenance Company. The normal repair parts supply system was used to support the M1, without the benefit of any special advanced stocking of an increased supply of spares.

In summary, the M1 again demonstrated that it was the best tank on the battlefield in '83 and that it represents a major improvement to our Army's conventional combat capabilities. In view of the continued improvement in Soviet/Warsaw Pact ground forces, especially in the armor and anti-armor areas, the M1's contribution to our national security as a part of the Army's modernized combined arms team cannot be over-emphasized.

Sincerely,

Glenn K. Otis  
General, USA

## Lewis Honored By Wings Club

Continued from Page 1

Thayer said that the United States must forever be prepared. "We must continue to rebuild our forces that were allowed to deteriorate during the 1970s," he said. "It is only because we increased the readiness of our forces so quickly that we were able to meet the many global challenges we face today."

Thayer added that "there are other longer-term investments that we must continue to make if we are to meet the challenges of tomorrow. Today, we have four aircraft built by the men that we honor this evening. But the pace of modern technology moves quicker. All of these aircraft will one day be obsolete."

"We must prepare now and invest today," Thayer said, "if we are to grasp the opportunities offered by technology to maintain the strength required to preserve freedom."

Thayer, a Navy ace in World War II, former test pilot and Chairman and Chief Executive Officer of the LTV Corporation until he took his present post, said that he had flown the F-16, F-15 and F-5 but not the F-14, "but I will rectify that shortly."

The four fighter aircraft were featured in a film shown after Thayer's talk. The film was entitled "The Wings Club Salutes the American Fighter Plane."





# Season's Greetings

## GD World

Vol. 13 No. 12

December 1983

### Land Systems Delivers Prototype XK1 Tank to Republic of Korea



**Prototype Delivered.** More than 300 dignitaries and guests witnessed the delivery by Land Systems of a prototype XK1 main battle tank to the Republic of Korea. Principal speakers at the ceremony, shown in the photo at right, were U.S. Deputy

Secretary of Defense Paul W. Thayer (left) and the Honorable Yoon Sung Min, Minister of National Defense for the Republic of Korea. Land Systems built two XK1 prototypes at its Detroit plant to meet Korean military specifications.



### Electric Boat Awarded \$1 Billion in New Contracts

The U.S. Navy late last month awarded more than \$1 billion in new construction contracts to Electric Boat.

One contract was for the 11th Ohio-class Trident missile-firing submarine. A second contract was for two 688-class fast-attack submarines.

Fritz G. Tovar, Electric Boat Vice President-General Manager, said the contracts "will help assure steady employment for our current workforce for the next several years."

The contract for the attack submarines was won on a competitive bid basis with Newport News (Va.) Shipbuilding and Drydock Company, which received a contract for a third 688-class submarine.

Electric Boat is the only shipyard equipped to build the Trident submarines.

"The good news is that Electric Boat won as much as they could have," said Senator John Chafee, Republican of Rhode Island, in commenting on the contracts. "This can only translate into jobs. I'm just delighted." This is a further indication of success for Electric Boat, he added.

The unnamed Trident has been assigned hull number SSBN 736; hull numbers for the new 688s will be SSN 754 and SSN 755.

The contracts came a week after the division had received an \$82.4-million contract from the Navy for initial work on

the 12th Trident submarine, SSBN 737. That contract, for long lead funding, enables Electric Boat to begin procuring material for building the ship.

The contract for the attack submarines brings the number built or under construction at the division to 26. The shipyard has already delivered 15.

Electric Boat has delivered three Trident submarines — USS *Ohio* (SSBN 726), USS *Michigan* (SSBN 727) and USS *Florida* (SSBN 728) — and currently has seven more in varying stages of construction. The fourth ship in the class — *Georgia* (SSBN 729) — is now undergoing sea trials and is scheduled for delivery early next year.

### Venezuelan Air Force Receives First Six F-16s

The first six of 24 F-16 multimission fighters ordered by the Venezuelan Air Force were delivered in mid-November.

Maj. Gen. Carlos Pinaud, Commander of the Venezuelan Air Force, set the theme for the arrival ceremony with the statement that "this is a joyful day for the Venezuelan Air Force . . . and profoundly significant for the defense of our country."

Among the attendees at the arrival ceremony were Venezuelan President Luis Herrera and Maj. Gen. Humberto Alcalde, Minister of Defense.

President Herrera, who inspected the six F-16s on the ramp after their arrival, was given a detailed description of the

Falcon's instruments and control system during a close-up view of the cockpit of one of the VAF's F-16s.

The arrival of the F-16s at the El Libertador Air Base coincided with the 63rd anniversary of the founding of the VAF, and a special air show was held as part of the delivery ceremony.

Hundreds of guests, including representatives from General Dynamics, saw flights of the oldest and of the newest Venezuelan military aircraft. The first flight was by a French Caudron G-3 biplane, built in 1914, which was the first aircraft in the Venezuelan Air Force.

That demonstration was followed by

an aerial show featuring one of the six F-16 Falcons that had arrived from Fort Worth earlier in the day. It was flown by Lt. Col. Maglio Montiel Arguello, Commander of the F-16 squadron at the base.

At a dinner following the delivery ceremony, David S. Lewis, General Dynamics' Chairman and Chief Executive Officer, and Herbert F. Rogers, Vice President and Fort Worth General Manager, pledged the corporation's support in helping the nation transition to the F-16 aircraft.

The remainder of the Fort Worth-built aircraft for the VAF are to be delivered to Venezuela periodically through 1985.



**Presidential View.** Venezuelan President Luis Herrera and high-ranking Venezuelan officials made a personal inspection of six Fort Worth-built F-16s after their delivery to the Venezuelan Air Force at the El Libertador Air Base last month. Shown above (left to right) Maj. Gen. Humberto Alcalde, Minister of Defense; President Herrera; Maj. Gen. Carlos Pinaud, Commander of the Venezuelan Air Force, and Lt. Col. Juan Paredes, a VAF F-16 instructor pilot.

### Dignitaries Attend Rollout Ceremony

A swirling snow squall failed to chill the national pride of high-ranking Korean officials on December 7th when Land Systems delivered a prototype of the Korean XK1 main battle tank.

The 53-ton tank, one of two prototypes built at Land Systems, was developed in a joint effort by the United States and the Republic of Korea. Officially, it is called the Republic of Korea Indigenous Tank, or ROKIT, and received the XK1 designation during the development cycle at Land Systems.

The delivery ceremony, which was attended by about 300 guests, was held in an aircraft hangar at Selfridge Air National Guard Base near Detroit. Land Systems produced the two XK1 prototypes at its Detroit Arsenal Tank Plant. The delivery of the prototype was a result of a decade of close cooperation between the government and industry of Korea and the U.S. Army. It involved a three-year joint development effort by Land Systems, the U.S. Army, the Korean military and Hyundai Rolling Stock Co., Ltd., of Korea, which will manufacture the tank in Korea.

The Honorable Yoon Sung Min, Minister of National Defense for the Republic of Korea, told the guests at the rollout ceremony that his country "is devoting itself to obtaining the capacity of self-defense through restrained strength."

"The function being observed today,"

*Continued on Page 2*

### Dutch Plan To Buy 57 Additional F-16s

The Dutch Cabinet recently approved a Royal Netherlands Air Force plan to purchase 57 additional F-16s with multiyear funding. The plan is now pending before the country's Parliament.

Since the Netherlands already has 156 aircraft on order, the new purchase would bring the total to 213. To date, 93 of the original F-16s have been delivered.

The aircraft in the new buy, as the Netherlands' other F-16s, would be assembled by Fokker at its factory near Amsterdam. The first F-16 for the Netherlands was delivered in 1979. The last aircraft under the new order would be delivered in 1992.



# Land Systems Delivers Prototype

*Continued from Page 1*

he said, "is anything but intended to spur an arms race with opposing forces . . . the effort represented here is to provide a means of deterrence and defense. It is part of Korea's long-term force improvement initiative with a view to making a durable peace."

Among other Korean dignitaries attending the ceremony were: Byong Hion Lew, Ambassador of the Republic of Korea to the United States; Maj. Gen. Ro Jung Ki, Military Attache to the United States, and Kim Chung Soo, President of Hyundai.

U.S. Deputy Secretary of Defense Paul W. Thayer noted how December 7th marked the anniversary of an event which demonstrated the results of military weakness. "Our two countries have learned the importance of strength and the painful consequence of weakness," Thayer said. "We send a signal to friend and foe alike — Korea will remain free; Korea will remain strong."

The Deputy Secretary added, "It is essential for the South to maintain forces strong enough to deter the North from even thinking anything could be gained by aggression."

Calling the XK1 "fast, lethal and tough," Thayer said that the strength this tank offers can deter war and preserve peace.

At the ceremony, General Dynamics was represented by Oliver C. Boileau, President, and George A. Sawyer, Executive Vice President, Land Systems and International. In his remarks, Boileau said the XK1 was designed to meet the ROK Army's unique requirements in a joint Korean/American team effort.

"The design criteria and the special features of the XK1," Boileau said, "were for-

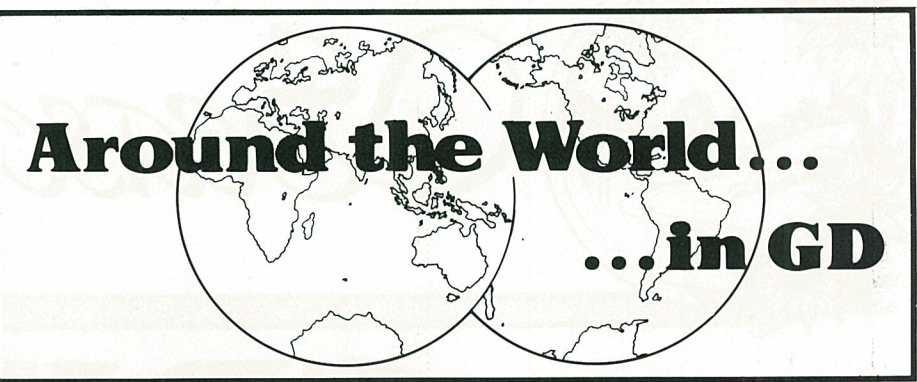
mulated in Korea. Through the superb teamwork and professional skills of the Korean engineering team working closely with our Land Systems personnel, a battle tank has been produced incorporating the highest level of technology."

"It is important to emphasize that this XK1 prototype is a prime example of what can happen when the industrial capabilities of two nations are combined to fulfill an important requirement," Boileau said.

Robert W. Truxell, Vice President and General Manager of Land Systems, said that "the mere presence of this weapon in the hands of our Korean friends will go a long way to encourage peace in the Pacific." He added that Land Systems personnel "share the pride with the Korean leaders who have worked . . . to make the XK1 reality."

The delivery of the prototype tank was symbolized by the transfer of the vehicle's Log Book from Dr. Phillip W. Lett, Land Systems Vice President, Research and Engineering, to Brig. Gen. Rhiew Ji Whan, ROKIT Program Manager for the ROK Army. The U.S. Army was represented at the event by Gen. Donald R. Keith, Commander of the Army's Material Development and Readiness Command, and Maj. Gen. Duard D. Ball, Commander of the Tank Automotive Command.

After the delivery ceremony, a Land Systems crew drove the XK1 out of the hangar and performed a series of maneuvers on a snow-covered taxiway to demonstrate the tank's capabilities. The XK1 is equipped with a 105-mm. gun, features advanced armor and sighting systems, carries a crew of four and is powered by a 1,200-horsepower diesel engine.



**CHQ:** Heidi Jansen joined as Subcontract Auditor.

**Electric Boat:** Norman Bailey was promoted to Senior Supervisor of Quality Assurance . . . Herbert Englund to Chief of Cost Engineering . . . Scott Hurley to General Foreman . . . Frederick Keith to Nuclear Project Manager . . . Irwin Pierce to Group Trade Planner . . . Raymond Thiel to Engineering Supervisor . . . Teddy Vaughn to Test Operation Senior Supervisor . . . Peter Volkmar to Engineering Supervisor . . . David Browning to Payroll Coordinator . . . Michael Marbitan and Bradford Burgess to Manager of Engineering/Design Services . . . William Cawley, Alan Halsband, John Lemieux and Edgar Tanguay to Assistant Chief Test Engineer . . . Steven Cook to Foreman . . . Robert Cullinen, Edmund Bernal, James Henley and William Shaffer to Nuclear Test Supervisor . . . Robert Dargell and David Thompson to Chief of Engineering . . . Isaac Duncan to Superintendent . . . Henry Guilian to Chief Test Engineer . . . Austin Kairnes to Project Manager-Nuclear Construction Site . . . Robert King to Senior Field Engineer-Reactor Plant Services . . . James Macaulay to Engineering Project Manager . . . Robert McManus to Project Control Coordinator . . . David Schlink to Project Administrator . . . Barbara Susi to Payroll Supervisor . . . At Quonset Point, Joseph Alves to Foreman II.

**Fort Worth:** M.R. Armour, Howard J. Beardslee, Thomas J. D'Arca and Michael D. Hillman were promoted to Field Service Engineer . . . Archie R. Baker to Financial Specialist . . . Russell D. Bell to Inspection Supervisor . . . Ishwar C. Bhateley, Howard L. Scott and Kim E. Wood to Engineering Chief . . . A.D. Blue to Project Tool Engineer . . . Charles D. Brightwell to Program Specialist . . . Michael D. Cash to Senior Field Engineer . . . Teddy R. Deaver to Chief of Quality Assurance . . . O. Earl Dixon, Leonard A. Holsborg and John D. Korstian to Senior Program Analyst . . . Aubery A. Dotson to Foreman . . . Billy F. Forgus to Senior Manufacturing Support Equipment Engineer . . . Norman E. Frost and Edwin R. Mackert, Jr. to Contract Representative . . . James J. Hardwick and Guy F. Woodard II to Project Coordinator . . . Jimmy C. Holder to Project Manufacturing Support Equipment Engineer . . . A.L. Holton to Chief Transport Pilot . . . Samuel C. Houston to Logistics Specialist . . . Boris W. Hrykewicz and Eugene A. Wadsworth to Project Engineer . . . James A. Johnson and Charles W. Washam to Chief of Logistics . . . Winford D. Jones and Ross Meadors, Jr. to Logistics Supervisor . . . Robert E. Lee and James W. Sexton, Jr. to Logistics Group Supervisor . . . Bobby W. Matthews to Manager of Logistics . . . Donald B. Norman to Manufacturing Control Supervisor . . . James O. Williams to General Foreman . . . Philip L. Williams to Senior Tool Engineer . . . Norman L. Wiseman to Material Planner . . . Robert A. Wright to Industrial Engineering Specialist.

**Convair:** Gary R. Beare, Robert A. Bergman and Robert O. Wolford were promoted to Operations Supervisor-Manufacturing . . . Burt M. Rice to General Operations Supervisor-Manufacturing Control . . . Michael S. Osborne and Douglas A. Stephens to Logistics Supervisor . . . Donald E. Simpson and Thao D. Vuong to Quality Assurance Supervisor . . . Herbert R. Van Hoose to Quality Assurance Group Engineer.

**Pomona:** Millann D. Allen and Robert J. Chavez were promoted to Project Representative . . . Noel E. Boykin to Manager Contract Administration . . . Davey L. Farrar to Senior Logistics Representative . . . Robert Gilmore to Procurement Administrator . . . Paul D. Heronime to Manufacturing Group Engineer . . . Gregory W. Hicks, Karen Dedow-Armstrong and Patricia A. Ulloa to Senior Manufacturing Engineer . . . Harold K. Keener to Accounting Supervisor . . . Leonard V. Lykins to Quality Assurance Project Administrator . . . Gregory Lysecky to Section Head . . . Dorothy L. McGunnigle to Test Engineer . . . Nicholas G. Opie to Manufacturing Supervisor . . . Joseph Perez, Roger D. Kleinsorge, Arthur E. Teel and David L. Rodricks to Superintendent . . . Gerald G. Rojewski, Richard A. Barnett and James R. Sogge to Group Engineer . . . Dale B. Snyder to Plant Engineering Chief . . . Jimmie D. Wilcoxson to Quality Assurance Specialist . . . William T. King to Cost Control Manager . . . John F. Kleinfelter to Plant Engineering Supervisor . . . James M. Lyon to Senior Tool Engineer . . . John S. Ohm to Chief Inspection . . . Don R. Salisbury, Jr. to Senior Industrial Engineer . . . Robert L. Sellars to Cost Control Chief . . . Albert N. Sena to Accounting Director . . . At Camden, Thomas M. Frizzle and James Jirus to Senior Buyer . . . Robert L. Gilreath to Technical Buyer . . . Cecelia C. Marden to Estimating Specialist . . . Wesley Marden, Jr. to Manager of Contracts . . . Lawrence E. McRay to Technical Procurement Manager . . . Clifford P. Weiss to Logistics Specialist.

**Land Systems:** Daniel P. Adair was promoted to Facilities Planning Specialist . . . Jack R. Ondrus to Production Control Manager . . . Thomas J. Post to Senior Production Planning Analyst . . . Edward P. Borkowski to Material Planning and Control Supervisor . . . Anthony Rusnak to Senior Logistics Engineer . . . Elizabeth A. Novak to Training Supervisor . . . Andrew J. DeStefano to Site Supervisor-ILS Field Operations . . . Glen T. Milligan to Material Planning Supervisor . . . Bernard F. Kiewicz, Jr. to Senior Program Management Representative . . . Karl G. Oskoian to Program Management Chief . . . Rudolph A. Belian, Jr. to Production Planning and Control Supervisor . . . Bruce M. McDonald to Production Planning Specialist . . . Richard E. Stanier to Program Management Chief-Engineering . . . Michael A. Thomas to Industrial Engineering Manager . . . Winfred L. Didlake, Jr. to Manager of Assembly . . . James E. Snoddy to Senior Business Planning Analyst . . . Lynn L. Maker to Purchasing Agent . . . Walter E. Lowe, Jr. and Randolph B. Duncan to Production Procurement Chief.

**Electronics:** Norman E. Berndt was promoted to Product Test Supervisor . . . Donald K. Dearduff to Senior Operations Project Manager . . . Roderick D. MacAllister to Procurement Administrator Supervisor . . . William T. Swart to Productivity Division Manager . . . Christopher L. Turner to Supervisor.

**GDSC:** Lewis H. Devine was promoted to International Personnel Manager . . . Raymond C. Fletcher to Maintenance Squadron Group Leader . . . Pedro R. Gutierrez to Logistics Group Leader . . . Edward L. Mason to Flight Line Branch Leader.

**Datagraphix:** William S. King was promoted to Senior Project Engineer . . . Patrick C. Grant to Marketing Software Project Engineer . . . Patrick R. Welch to Systems Specialist.



**Value Engineering Studied.** John D. Jackson, Manager of Cost Reduction and Value Control at Fort Worth, explains a value engineering project that involved the F-16 to participants in a recent seminar at Wright-Patterson AFB, Ohio. Three of the six value engineering projects studied by the Air Force personnel were from the F-16 program.

## Fort Worth Employees Demonstrate Key Contractor's Role in Value Engineering

Employees from Fort Worth's Cost Reduction and Value Control Department were praised for their participation at a 40-hour value engineering seminar held recently at the U.S. Air Force Aeronautical Systems Division, Wright-Patterson AFB, Ohio.

Gen. Bernard Weiss, USAF Director of Contracting and Manufacturing Policy, said Fort Worth's participation in the seminar demonstrated the important role contractors play in making the Air Force value engineering program an effective tool for controlling costs.

Value engineering teams consisting of Engineering, Contracts, Configuration

Management, Quality and Manufacturing personnel at ASD studied six actual value engineering projects in the course of the seminar. Three of the projects were from the F-16 program.

John D. Jackson, Manager of Cost Reduction and Value Control, introduced the projects and provided team guidance. Additional support was obtained through telephone contacts between the teams and Fort Worth Engineering personnel.

The value engineering contract clause allows defense contractors to share in savings that result from Value Engineering Change Proposals.

Savings and Stock Investment Values			
Salaried	October 1981	October 1982	October 1983
Government Bonds	\$ 2.7293	\$ 3.2826	\$ 3.5780
Diversified Portfolio	2.0562	2.4013	3.1048
Fixed Income	1.2607	1.4043	1.5739
Hourly			
Government Bonds	2.7269	3.2806	3.5762
Diversified Portfolio	2.0998	2.4517	3.1678
GD Stock	\$26.5600	\$32.7500	\$54.5000



## FB-111A Wing Wins Fairchild Trophy 3rd Time

The 509th Bomb Wing based at Pease AFB, N.H., flying Fort Worth-built FB-111As, won the prestigious Fairchild Trophy for the third consecutive year in the Strategic Air Command's recent Bombing and Navigation Competition.

The trophy is awarded to the U.S. Air Force wing that achieves the highest combined bomber and tanker scores in the annual competition. It is named in honor of Gen. Muir S. Fairchild, an aviator who served in both world wars and was Vice Chief of Staff of the Air Force until his death in 1950.

FB-111s, which have been called "the most accurate bombers in the world" by USAF leaders, have won the trophy in eight of the last nine years.

For the fourth straight year, the 509th won the John C. Meyer Memorial Trophy, which is awarded to the F/FB-111 unit achieving the highest damage expectancy rating. The rating is calculated on the basis of bombs delivered. A 509th Bomb Wing crew also won the award for Best FB-111 Crew.

The competition was held at Barksdale AFB, La. Crews from 15 bombardment wings and one tactical fighter wing participated.

## Tomahawk Flies 750 Miles in Successful Test

A Convair-built Sea Launched Cruise Missile was successfully launched last month from the destroyer USS *Merrill* (DD 976), the fourth in a series of surface ship developmental and operational test flight demonstrations in the cruise missile program.

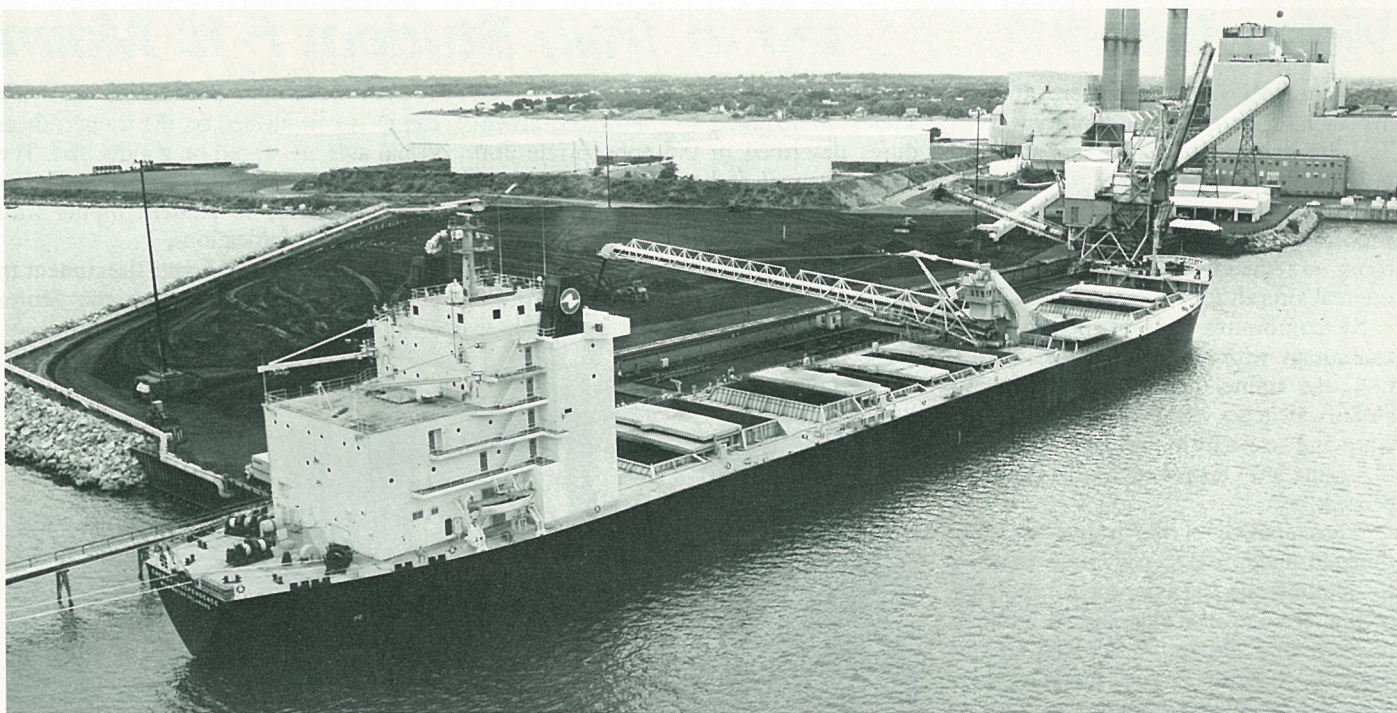
The unarmed nuclear land-attack Tomahawk was launched from a production armored box launcher installed on the ship's forward deck. The missile successfully flew a fully guided mission of more than 750 miles to a target area on the Utah Test and Training Range, located in the Western Utah desert. Once inside the target area, the missile made a pass over a simulated target before being safely recovered, using the missile's parachute recovery system.

This was the first launch of a nuclear land-attack SLCM from a surface ship. Other tests from surface ships included two conventional land-attack missiles on March 6, 1983, from the *Merrill*, and May 10, 1983, from the battleship USS *New Jersey*. An antiship Tomahawk was launched from the *Merrill* on March 19, 1980.

Tomahawk cruise missiles are planned for deployment on destroyers, cruisers and battleships, as well as attack submarines.

The nuclear land-attack variant for the Navy is scheduled for deployment aboard surface ships and submarines in mid-1984. Initial fleet capability of Tomahawk conventional land-attack and antiship variants was achieved in armored box launchers aboard the *New Jersey* in March 1983.

Convair is producing the Sea Launched Cruise Missile for the U.S. Navy and the Ground Launched Cruise Missile for the U.S. Air Force. Development, testing and production of Tomahawk is under the direction of the Department of Defense's Joint Cruise Missiles Project.



**Heavy Loads.** The SS *Energy Independence*, the first oceangoing coal-fired collier to be built in the United States in more than a half-century, has delivered more than 550,000 tons of coal since being delivered to New England Electric last August 6th. The 665-foot-long, 32,366-ton vessel, which was designed and built by Quincy Shipbuilding, is shown unloading at New England Electric's generating station at Brayton Point, Somerset, Mass. *Energy Independence* is expected to carry about 2.4 million tons of coal each year from ports in Pennsylvania, Maryland and Virginia to the Brayton Point and Salem Harbor power stations in Massachusetts.

## Land Systems' Engineering Lab Advances Fire Control Technology

The Engineering Laboratory at Land Systems is designing, developing and building prototypes for a number of advanced fire control systems that implement technology that is more advanced than the present M1 tank system.

"Advances are being made in all major areas of fire control, including sighting, range finding, weapon and sight stabilization, ballistic computation, controls, displays and human factors," said Gerry Strehl, Manager of the Advanced Fire Control Laboratory. "In general, the armaments used in future vehicles will be like those used in the past, but their ballistic characteristics will be further controlled to get the highest firing accuracy both from stationary and moving vehicles."

Tony Ciccone, Project Manager for the Tank Test Bed Fire Control System, said, "Sights are generally becoming smaller, and the vehicles will carry more of them to permit all of the crews to be simultaneously involved in surveillance and engagement."

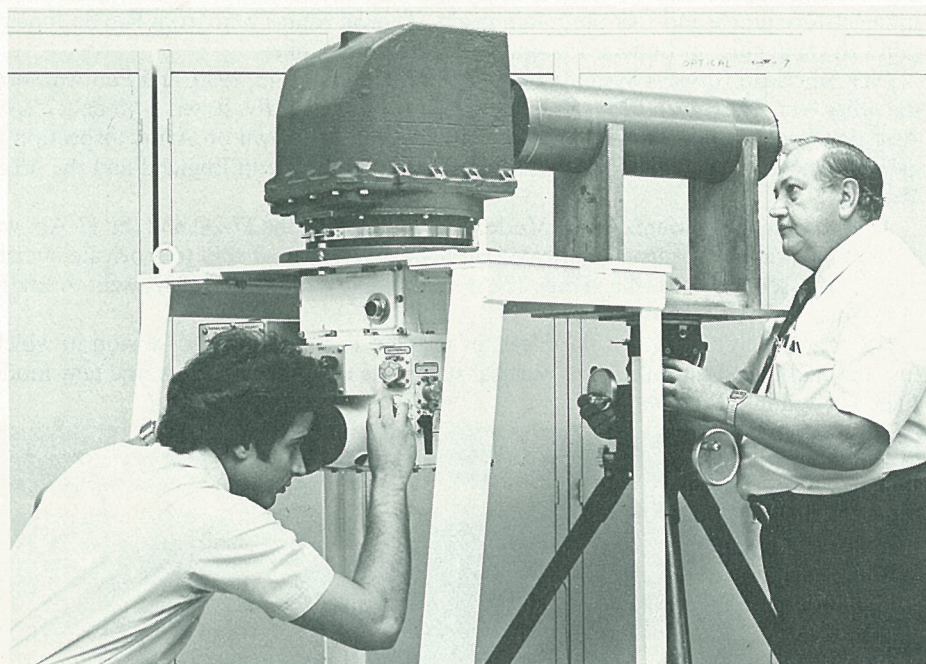
"High-resolution television systems are being designed into sights, adding another sighting sensor technology to the improved

direct optical and thermal-imaging subsystems used in present vehicles."

Ciccone added that automatic loading devices in the next-generation vehicles will separate crew members from the weapon and require remote controls that, in turn, expand the usage of digital computers and associated busing systems. "These vehicles will implement remote control of many functions previously done directly by a crew member, such as loading rounds and controlling sight images," he said.

"The crew compartment will be more compact and look like an aircraft cockpit with each crew member seated in front of the console that will be designed to assist him efficiently in performing his specific tasks," Ciccone said.

One factor unlikely to change on future vehicles is that the new fire control systems will be operated and maintained by crews with a relatively small amount of training, Ciccone said. "As technology advances, systems must become more sophisticated without becoming more complex to the operators. Improved human factors and automatic self-testing devices must be included in all designs of new fire control systems," he said.



**Line of Sight.** The alignment of a six-inch collimator — used for adjusting the line of sight on telescopes — by Steve Senkow, Manager Advanced Fire Control Laboratory, at left, permits John Cicala, Design Engineer, to perform developmental tests on the electronic system in the computing subsystems for a prototype 360-degree panoramic sight.

## Land Systems' U.S. Army M60 Deliveries End

The final M60A3 main battle tank for the U.S. Army under the present contract was delivered by Land Systems in November.

The present contract calls for continued M60A3 production, with delivery of subsequent tanks to be made to foreign military services. Additional orders are expected from allied countries that would extend M60A3 production well into 1985.

The last delivery was made by the Detroit Arsenal Tank Plant almost exactly 23 years after it had delivered the first M60 to the U.S. Army. Since November 1960, more than 14,000 M60-series tanks have been delivered to the U.S. and allied countries by the Detroit plant.

Commenting on the duration of the M60 production program, Harry Grocoff, who was an M60 tool and gauge inspector in 1960, said, "the M60 program has given many of us good job opportunities and security for a lot of years. Originally, we were told the M60 would last only 10 years, maximum, and today, after 23 years, it still has a future." Grocoff now is Supervisor of the Metrology Laboratory at the Detroit plant.

The M60A3 is the fourth and most advanced tank model in the M60 series, and 2,375 have been produced by the Detroit plant since 1978. From 1960 to 1980, 11,209 M60, M60A1 and M60A2 tanks were produced, with the M60A1 leading the way with 8,838. Additionally, 418 Armored Vehicle Launched Bridges and 354 M728 Combat Engineering Vehicles, which were built on M60-series chassis, were delivered.

Improvements over the original M60 include improved turret armor, solid state fire control, laser rangefinder, fully stabilized gun, thermal-imaging night sight, improved engine and track and hundreds of other improvements that evolved through years of experience and engineering change.

"The M60A3 tank is so different from the original M60, that you may as well be comparing a tractor to a fully computerized, solid state 1983 sports car," said Arthur A. Phillis, who helped build the first M60 prototype and is now Superintendent of Tank Test and Adjust at the Detroit plant.

## Sparrow AIM-7M Guided to Target by Pomona-Produced Systems

The first flight of a Sparrow AIM-7M missile configured with guidance and control systems produced by Pomona has resulted in a tactical kill of a drone target.

The 12-foot-long interceptor missile was launched from a U.S. Navy F-14 at the Naval Weapons Center test range at China

Lake, Calif., as part of the program to qualify General Dynamics as a source of Sparrow AIM-7M guidance and control sections.

The AIM-7M guidance and control sections are being produced at Pomona's Camden, Ark., facility. Pomona became a

qualified producer of the earlier Sparrow AIM-7F version in 1976. When production was concluded in 1981, 3,000 AIM-7F guidance and control sections had been manufactured. More than 2,000 of the new AIM-7M guidance and control sections are on order from Pomona.

# GD World

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## Video Technology Used to Train Student F-16 Maintenance Crews

Training Systems engineers at Fort Worth have developed a prototype F-16 Test Set Familiarization Trainer that can give student maintenance technicians practical experience in testing and troubleshooting aircraft systems in the classroom — reducing the need for them to use real aircraft for training.

By combining state-of-the-art video technology with computer-based instruction, the trainer challenges students to identify switches and other aircraft hardware and to perform "organizational" or flight-line level testing and fault isolation procedures.

"Development of the trainer was authorized under a U.S. Air Force contract to demonstrate the concept of applying computer-controlled videodisc technology to a training situation," said Bill Guinn, Training Systems Project Engineer who managed the device's development. "Under F-16 System Program Office direction, the trainer has been demonstrated to more than 200 key USAF personnel at eight Air Force bases including Randolph, Langley, Sheppard and Wright-Patterson."

According to Bob Spillane, Training Systems Senior Engineer, the main components of the trainer are a laser-beam videodisc player, a personal computer, a television with a touch screen and a simulated Remote Control Unit for the F-16

Stores Management System Test Set. The student is required to follow the procedures described in the appropriate Job Guide manual as he pushes buttons on the RCU and accomplishes simulated maintenance actions using the touch screen.

The TV displays motion and still-frame video of all aircraft components involved

in each of the four operational tests that can be accomplished on the trainer; these visual aids are stored on a videodisc. The RCU, which is controlled by the computer, responds to student inputs with actual test set indications.

"If the Job Guide directs the student to actuate a certain switch on the Stores

Control Panel, for example, the student looks at the picture of the SCP that is displayed on the TV and touches the spot where the correct switch is depicted. The touch screen relays the student's selection to the computer, which directs the appropriate video and/or RCU change to provide positive feedback of the action accomplished," said Spillane.

In the field, two technicians are required to perform the testing procedures: one in the cockpit with the RCU and one on the ground with the remainder of the test set. The trainer allows each student to perform both the cockpit and ground tasks simultaneously. "This gives the student a total picture of what is going on and of how the two jobs relate to each other," Spillane said.

Another advantage of the trainer is that instructors can insert predesignated faults into the program. When this is done, the student must recognize and identify that the fault exists. He then uses a Fault Isolation Manual to determine what corrective maintenance action is required.

"USAF response to the new training concept has been very positive," Guinn said. "The technology is being applied to proposed F-16C maintenance trainers and the USAF is considering applying it to other weapons systems."



**Computer Trainer.** Bob Spillane, Fort Worth Training Systems Senior Engineer, prepares to select a training program for a simulated troubleshooting exercise by touching the screen on the F-16 Test Set Familiarization Trainer.

## Attack Submarine Augusta Will Be Launched Jan. 21

The U.S. Navy's newest 688-class fast-attack submarine, *Augusta*, will be launched at Electric Boat's Groton, Conn., shipyard January 21st.

The *Augusta* (SSN 710), named for the capital city of Maine, will slide into the Thames River exactly 30 years to the day — Jan. 21, 1954 — that Electric Boat launched the USS *Nautilus*, the world's first nuclear-powered ship.

Senator William S. Cohen, Republican of Maine, will be the principal speaker at the ceremony, and his wife, Diana, will christen the 360-foot, 6,900-ton submarine.

Senator Cohen is chairman of two Senate subcommittees — the Armed Services Committee's Subcommittee on Sea Power and Force Projection and the Governmental Affairs Committee's Subcommittee on Oversight of Government Management.

## 688-Class Submarine To Be Named in Honor Of Providence, R.I.

The Navy has officially assigned the name *Providence* to the 688-class fast-attack submarine SSN 719 now under construction at Electric Boat.

The name, which honors the capital city of Rhode Island, has been carried by four previous U.S. Navy ships.

The first three served in the Revolutionary War. They were a 12-gun sloop (1775-1779), a 28-gun frigate (1776-1780) and a gundalow — a small sail- and oar-powered gunboat (1776).

The fourth *Providence* (1945-1978) originally was a light cruiser (CL 82), but she was converted to a guided missile cruiser (CLG 5) and won two Navy unit commendations and seven battle stars for her service in the Vietnam War.

## Employees Help Lead Business Conference

Two Material Department employees, one from Fort Worth and one from Electronics, helped conduct the 1983 Business Women West Conference which was held recently in Los Angeles. General Dynamics was a sponsor of the event.

Jan Dean, Small Business Officer at Fort Worth, and Betty Fleming, Small Business Coordinator at Electronics, counseled conference attendees on business opportunities that are available through subcontracting from major firms.

## GD Flashback

### Fleetster 17 Was Ultramodern Design in 1929

When it came to sleek lines, trim shape and speed, the Consolidated Fleetster Model 17 was far ahead of its time.

The single-engine monoplane was a radical departure from the fabric-covered biplanes and ungainly looking flying boats previously built by the Consolidated Aircraft Corporation, a predecessor of Convair. By all standards, the Fleetster was a flashy design with its streamlined features, smooth skin and appearance of power.

Built in 1929, the Fleetster 17 was the first U.S. transport plane with an all-metal monocoque fuselage, using metal techniques Consolidated had developed in constructing flying boat hulls. In monocoque construction, the outer skin carries all or a major part of the stresses on the aircraft. The circular fuselage is built up of metal rings and bulkheads with slim longitudinal stringers, to which a smooth aluminum alloy skin is riveted.

The Fleetster also had a thick wing of wood construction covered with plywood which required no external bracing. The combination of the monocoque fuselage and the strutless cantilever wing gave the aircraft its ultramodern appearance.

The Fleetster, named in honor of Reuben H. Fleet, Consolidated's President and General Manager, was the second plane built in 1929 at the company's Buffalo, N.Y., plant. The first was the huge Commodore Model 16 flying boat, built for NYRBA, Inc., the New York-Rio-Buenos Aires airline, of which Fleet was a director and financial supporter. When NYRBA decided that it needed a smaller transport for its interior routes to go with its long-haul, 30-passenger Commodores, Consolidated responded by coming up with the Fleetster.

To meet NYRBA's needs for medium loads, the Model 17 was designed to carry eight passengers in the cabin. Powered by a 575-horsepower Pratt & Whitney Hornet engine with a metal propeller, it had a cruising speed of 153 miles an hour but could maintain its top speed of 180 miles an hour with ease. It could carry a useful load of 1,974 pounds and had a range of 675 miles and a service ceiling of 18,000 feet. It had a wingspan of 45 feet and a length of 31 feet, 9 inches.

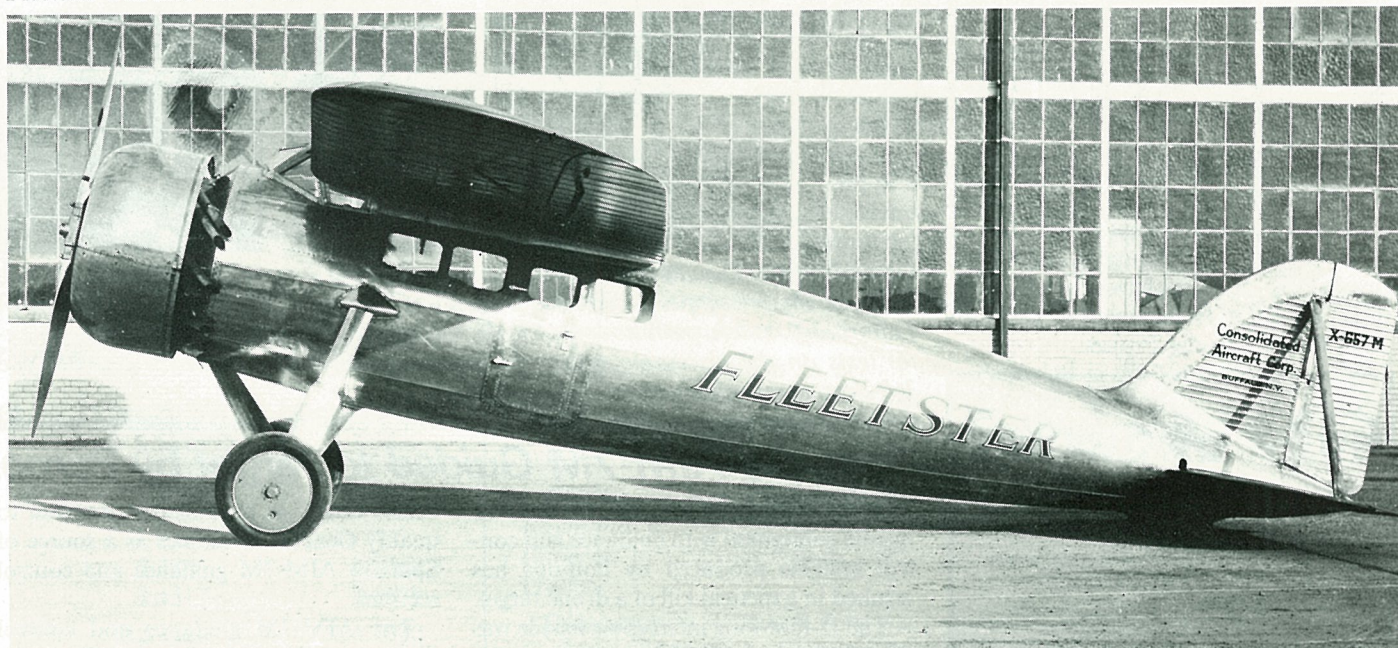
The prototype first flew in October 1929. Because of the nature of its NYRBA flying, the airplane was certificated on Jan. 23, 1930, as both a landplane and a floatplane. The price was \$27,500 at the factory for either version.

Four Model 17s were built, and three of them went to NYRBA. At least one of them is known to have been operated by NYRBA as a floatplane. The fast monoplane was an immediate success in flying feeder services between principal South American stopovers and the hinterlands while NYRBA's 10 flying boats flew the main routes. The Fleetster carried passengers and mail over pampas, impenetrable jungle and vast mountain peaks. Typical routes were from Rio de Janeiro to Puerto Alegre, Brazil, and from Buenos Aires to small cities in Bolivia, Paraguay, Uruguay and Chile.

Pan American Airways System bought NYRBA on Sept. 15, 1930, and Pan Am soon after sold one Fleetster. In 1934, it scrapped the other two. The fourth Fleetster, meanwhile, continued to fly. It was a Model 17 Special used as the personal transport of the U.S. Assistant Secretary of War, F. Trubee Davison, and was flown on Army inspection trips by then Capt. Ira C. Eaker. Eaker later gained fame as the commander of the U.S. Eighth Air Force in England and the Mediterranean Allied air forces in Italy in World War II.

Two commercial variants of the Model 17 were built — the 17-2C and the 17-AF, with Wright Cyclone engines. Possibly the only 17-2C built was the airplane certificated on Sept. 29, 1930, and sold to a private owner. In 1933, it was sold to Pacific International Airways for service in Alaska. Three 17-AFs, certificated on June 1, 1932, went to Ludington Airlines for fast shuttle service between New York and Washington, D.C.

Continued development of the Fleetster resulted in a parasol-type version in which its wing was raised about a foot above the fuselage and rested on four small, vertical struts. As the 20-2 and 20-A, the new model continued the success and the name of the Fleetster well into the 1940s.



Consolidated Aircraft's Prototype Fleetster 17